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THE EFFECT OF LOCAL FOOD ENVIRONMENTS ON FAMILY FOOD CHOICES AND FOOD RELATED BEHAVIOURS

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MSc. by Research in Biological Anthropology
Department of Anthropology
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2016

ABSTRACT

This thesis examines the extent to which local food environments influence family food choices and food related behaviours in order to assess 1) how do local food environments differ 2) how do people use their local food environment 3) how do aspects of socio-economic status 4) how do other aspects of family life and 5) what other factors influence family food choices and food related behaviours. This thesis compares four British towns; Barnard Castle and Consett in County Durham and Tunbridge Wells and Chatham in Kent to assess how local food environments and food choices differ between areas of similar geography and unitary governments as well as between areas of high and low socio-economic status. Using a novel methodological approach I have combined four previously established methods to provide a holistic and comprehensive overview of the complex system of food environments and their implications on food choices, which one method alone would be incapable of doing. 1) GIS methods were used to assess the physical food environment, 2) participatory mapping was used to provide an insight to how the environment is perceived and used, 3) seven day food recalls provided data on the actual food consumed and finally 4) adapting the traditional method of participant observation I was able to identify influential factors to food choices and food-related behaviours.

The findings indicate that local food environments differ both in their design (research question 1) and in how they are used between these four towns (research question 2). Differences between towns are most significant between areas of socio-economic status (research question 3), however differences were also present between aspects of family life (research question 4), personal preference, convenience and social networks (research question 5). As a result, the nutritional intake of households also differs such that areas of lower socio-economic status have significantly lower intake of fruit and vegetables but a higher intake of fast food, fizzy drinks and convenience foods. The greater capital a household has in terms of their socio-economic status the more selective they can be in actively seeking foods that also reflect other preferences such as moral beliefs and social networks and thus influences on their nutritional intake.

Department of Anthropology
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DECLARATION

Some material of this thesis has previously been submitted for undergraduate dissertation at Durham University by the author. Preliminary results were presented in the undergraduate thesis, however, all material in this thesis is the authors original contribution.

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I would like to dedicate this thesis my grandfather, Peter - sorry you're can't be here to read the final thing.

INTRODUCTION

The factors that influence decisions about food procurement, preparation and consumption are an interaction of an individual's economic, social and geographical positioning. Food choice is partly determined by those foods that are available, accessible, preferred and affordable within the local food environment. Whilst the micro-environment will define which stores are available and accessible, the particular food types chosen will depend on those that are preferred, or accepted, and those that are affordable. The effects of the recession in the UK, between 2007 and 2012, highlighted the influence of food prices on dietary patterns. During the recession there was a substantial increase in food prices compared to wages, which placed significant pressure on households with children (Griffith, O'Connell and Smith, 2013). As a result, dietary intake shifted towards poorer quality foods (Griffith, Lluberas and Luhrmann, 2013). Understanding food choices in households with young children is significant because eating habits are established at a young age (Burt and Hertzler, 1978; Olvera-Ezzell, Power and Cousins, 1990; Klesges *et al.*, 1991; Timperio *et al.*, 2008; Holsten *et al.*, 2012) and are likely to continue into adulthood (Wang, Monteiro and Popkin, 2002). Therefore, by understanding the factors that influence dietary habits early on in life it is possible to understand short and long-term nutritional and health outcomes (Olvera-Ezzell, Power and Cousins, 1990; Borah-Giddens and Falciglia, 1993; Wang, Monteiro and Popkin, 2002; Holsten *et al.*, 2012).

The multi-dimensionality of food availability within the immediate geographical area and the complexity of food choices (Shepherd, 1999; Ulijaszek, 2007; Kittler, Sucher and Nahikian-Nelms, 2011; Gallo, Barrett and Lake, 2014) limits the usefulness of a single method in order to understand fully how local food environments influence food choices. Different disciplines have studied food availability and choices from different perspectives covering a broad field of theory, models and methods. There are a few examples of the combination of different areas of research and their associated methods in order to allow for an understanding, or appreciation, for the multi-dimensionality of food environments and dietary choices. I have employed systems theory as a framework to evaluate the

geographical and socio-economic status differences in food environments and choices within Britain. Systems theory is a theoretical approach that investigates how individual, heterogeneous, aspects integrate and relate with one another to appreciate the collective behaviours of an entire complex system. In order to do this, I have selected four British towns (Barnard Castle, Consett, Tunbridge Wells and Chatham) which represent the differences between the north and south of the country as well as different levels of socio-economic status (SES) (see Table 1.1). Only two counties, Kent and County Durham, have been used in order to control for unitary authority differences. Within each town I combined study of the physical food environment with participant observation of 20 households and measures of dietary intake in 25 families with children under the age of ten in order to explore the dynamic relationship between individuals, their food environments and food choices to specifically answer the following research questions:

1. How do local food environments differ?
2. How do people use their local food environment?
3. How do aspects of socio-economic status influence family food choices and food related behaviours?
4. How do other aspects of family life influence family food choices and food related behaviours?
5. What other factors influence family food choices and food related behaviours?

Table 1.1: Study sites by north/south divide and SES

	Low SES	High SES
North	Consett	Barnard Castle
South	Chatham	Tunbridge Wells

1.1 Systems Theory

Systems theory argues that a system cannot be fully understood without an appreciation of all of its component parts and elements (Luke and Stamatakis, 2012). The different elements are considered to be heterogeneous, that relate with one another and therefore, influence one another that may either persist or adapt over time (Diez Roux, 2011; Luke and Stamatakis, 2012). The theory of public health has regularly used systems theory as the framework recognises that individuals are part of a dynamic and inter-related set of systems, such as their economic, geographic and social environment (Diez Roux, 2011). This is also referred to as social complexity and complex systems (Dietz and Burns, 1992; Nayga, 1996). Individuals are dependent on others for biological as well as social needs and as a result are constantly interacting with one another. Therefore, the social position or behaviours of one individual will have implications for others. Systems theory recognises the importance of this and provides a platform for understanding the multi-dimensionality of human life and the various factors which influence lifestyle choices and overall health (Phillips, 1999; Diez Roux, 2011; Luke and Stamatakis, 2012).

Understanding that one individual, condition or behaviour influences, and is dependent on others is a key foundation of systems theory and the feedback loops that this often leads to. Feedback loops can be both positive, for example, the availability of healthy food promoting healthier diets which then creates a greater demand for healthier foods (Diez Roux, 2011, p. 2), as well as being negative. Negative feedback loops can have dampening effects on changing or maintaining behaviours over time (Diez Roux, 2011; Luke and Stamatakis, 2012). Complex system approaches can, therefore, be used to explain why some people make significant changes to their diet, such as becoming vegetarian or avoiding certain items, whilst others maintain or are resistant to making changes over time. When individuals make decisions, not only in relation to dietary choices but also other lifestyle factors, the choices are defined and restricted by other heterogeneous factors, such as income, culture and geography, such that “dietary behaviour is determined by a complex combination of biological, socio-cultural, economic and technological factors” (Costa *et al.*, 2013, p. 99). Understanding how individuals make decisions or perceive the options available to them may also explain their food choices.

The multiple concepts that influence an individual's, and household's, food environment and dietary choices cover many different domains, such as political, economic, geographic,

biological and social. Therefore, when studying food environments and food choices, a methodological approach that appreciates all the factors that combine to influence the complex system is required. Combining multiple methods and techniques has been used more especially with the development of bio-cultural and complex system approaches to studying human health and wellbeing. Bio-cultural approaches allow for an exploration of the relationship between the biological and cultural environment in which an individual belongs. Cultural foundations influence behaviour and attitudes, including attitudes towards food, which may in time alter biology (e.g. lactose tolerance (Itan *et al.*, 2010)) but also shows the biological constraints to particular cultural adaptations (e.g. allergies (Kittler, Sucher and Nahikian-Nelms, 2011)). As a result, mixed method approaches to research allow for feedback loops and multiple influential aspects to be identified and appreciated and have become increasingly popular across disciplines (Johnson and Onwuegbuzie, 2004; Driscoll *et al.*, 2007; Creswell, 2011). A mixed-method approach is commonly described as a move away from the qualitative and quantitative dichotomy. The multi-method research approach acknowledges that both techniques are valid and useful by combining the strengths of both qualitative and quantitative research, and in doing so minimising their weaknesses (Johnson and Onwuegbuzie, 2004; Driscoll *et al.*, 2007; Creswell, 2011).

The complex systems of food environments and food choices requires a method and theoretical foundation that can account for all possible factors and implications as well as their interactivity. However, no sole method is capable of describing and quantitatively analysing the local food environment and its potential implications of household food choices. There is little evidence of more than two techniques being used together in food choice or environment related fields. This lack of evidence is despite the fact that each method has the potential to understand different, but equally important, aspects of food environments and food choices, which used in tandem can provide a holistic picture of the dynamic relationship. The complexity of food choices and the ways in which people interact with their local food environment is determined by a combination of multiple, inter-related factors. The present study takes advantage of four methods (food recalls, participant observation, participatory mapping and Geographic Information Systems (GIS)) in order to answer the research questions as well as to address the limitations, or 'gaps', in existing literature. By developing a multi-faceted perspective, using a novel methodological approach, this study will provide a more comprehensive understanding of the multi-layered and dynamic relationship between food environments and dietary choices.

1.2 Local Food Environments

1.2.1 What are Local Food Environments?

Local environments are the immediate and accessible areas, both physical and social, to an individual or household. The local environment has been shown to influence many different behaviours and subsequent social and health outcomes (Morland, Wing and Diez Roux, 2002; Frank *et al.*, 2006; Morland, Diez Roux and Wing, 2006; Diez Roux *et al.*, 2007; Cleland, Timperio and Crawford, 2008; Wood *et al.*, 2008; Hoek and McLean, 2010; Thornton and Kavanagh, 2010; Turrell, 2010; Franco *et al.*, 2014), including dietary habits (Story, Neumark-Sztainer and French, 2002; Cummins and Macintyre, 2006a; Liese *et al.*, 2007; Hoek and McLean, 2010; Caspi *et al.*, 2012; Aloia *et al.*, 2013). Local food environments are, by general consensus, specifically the geographical micro-environments where people procure their food (Thornton and Kavanagh, 2010; Kelly, Flood and Yeatman, 2011). These geographical areas are most often the areas surrounding where a person lives or works as well as local developed shopping and retail parks (Kelly, Flood and Yeatman, 2011).

The physical food environment, specifically the stores present within it, influences which foods are procured by defining those that are available, accessible, affordable, acceptable and accommodated (Thornton and Kavanagh, 2010; Caspi *et al.*, 2012). Availability is the presence of different food store types (e.g. fast food restaurants and supermarkets) within the environment as well as the presence of particular food and drink types (e.g. fruit and alcohol). As a result, the food stores and the products within the stores will define what is available to be purchased. Accessibility refers to the geographical positioning of and the ease of getting to stores. Ease of access is not necessarily the shortest distance but may also be determined by the convenience of travelling to stores via private or public transport. Affordability relates to food prices, in particular whether the price is deemed reasonable and in turn influences, which stores are used and which foods are purchased. Reasonable prices are defined by individual (or household) income and their available food budgets and will also factor public transport, car maintenance or parking costs. Food and store acceptability refers to individual food preferences and attitudes as well as dietary requirements, for example specific ethnic cuisines or allergies. Finally, the accommodation of food stores includes factors such as store opening times and the presence other facilities, for example ATMs or pharmacies, which are convenient in order to fit around

work, other responsibilities and lifestyle factors. The availability, accessibility, affordability and accommodation of food stores, as described here, highlight that foods an individual is able to procure, and subsequently consume, are restricted and determined by those foods that are available within their food environment (Glanz *et al.*, 2005; Caspi *et al.*, 2012). Using GIS methods to measure and quantify the local food environment, the present study is able to assess the availability and to some extent the geographical accessibility to food stores. Whilst the physical environment has been shown to be influential in understanding food choices and food availability, how the local food environment is quantified and measured can have important implications on how the environment is understood and used.

1.2.2 Food Store Availability

The food stores available within a given environment are determined by a number of factors, including local politics and socio-economic status (SES). UK law states that all businesses must apply for a trading permit from the local government before selling any food based goods. It is then the responsibility of the local council to ensure that health, safety and hygienic practices are adhered to. All applications are made public and can be contested by local residents. With this information, the local authority will then accept or deny the request from the business to sell food (GOV.uk, 2016). Therefore, the political, economic and social standing of the local government and factors such as cost, neighbourhood crime rates and infrastructure (Popkin, Duffey and Gordon-Larsen, 2005; Thornton and Kavanagh, 2010) is influential in determining which stores are able to trade within the town and therefore the composition of the local food environment. Below are the definitions used in the present study of three common store types available in the four UK study sites (supermarkets, convenience stores and fast food restaurants) and their implications on food choices.

1.2.2.1 Supermarkets

Supermarkets have previously been defined in the UK as a self-service food store with centralised checkouts and a sales area of at least 2,000 square feet (Jetter and Cassady, 2006). Within the last few decades, food production and distribution methods have altered significantly, shifting the food market away from smaller establishments, such as markets and grocery stores, towards large supermarkets and hypermarkets, where the majority of all food is purchased in developed countries (Chaix *et al.*, 2012; Costa *et al.*, 2013). As a result

of this dependence placed upon supermarkets for food procurement, geographical areas where there is a lack of access to supermarkets, have been described as ‘food deserts’ (Barratt, 1997; Cummins and Macintyre, 2002; Pearson *et al.*, 2005). ‘Food deserts’ have been associated with higher rates of obesity, cardiovascular health and other nutrition related conditions (Cummins and Macintyre, 2002; Morland, Wing and Diez Roux, 2002; Morland, Diez Roux and Wing, 2006; Chaix *et al.*, 2012). On the other hand, being in closer proximity to a supermarket has been associated with higher fruit and vegetable intake and overall higher quality diets (Cummins and Macintyre, 2006b; Chaix *et al.*, 2012). Geographic Information Systems (GIS) studies have been pivotal in research concerning food deserts, by providing quantitative evidence for this concept, such as the presence and density of supermarkets (Cummins and Macintyre, 2002; Thornton and Kavanagh, 2010; Caspi *et al.*, 2012). Nevertheless, close proximity to a supermarket does not necessarily determine their use. Instead supermarket use is also driven by other factors such as personal preference, access and income.

Research, particularly in the UK and US, has shown that food deserts are most commonly found in areas of low SES (Mooney, 1990; Sooman, Macintyre and Anderson, 1993; Cummins and Macintyre, 2002; Morland, Wing and Diez Roux, 2002; Guy, Clarke and Eyre, 2004; Chaix *et al.*, 2012). As a result, food deserts have been associated with poorer dietary habits and other nutrition related conditions. However, other research in the UK has shown that there is little difference between supermarket presence and access in poor and wealthy neighbourhoods (Cummins and Macintyre, 1999, 2006b; White and Kokotsaki, 2004; Daborn, Dibsall and Lambert, 2005; Pearson *et al.*, 2005). As such it has been argued that the UK does not have food deserts. Instead, the geographical differences in dietary habits may result from the presence of other food stores, the supermarket chain available, the food types sold within each available supermarket and other socially determined food preferences (Pearson *et al.*, 2005).

The presence of larger developments, such as supermarkets place pressure on smaller, independent businesses, which may also explain the possible presence of food deserts in the UK. The availability of multiple services in one location deters customers from travelling to other smaller stores (Wells and Watson, 2005). Ethnographic data in London suggests that smaller business owners resent the larger developments. Larger businesses are able to provide incentives to the council to approve their permits, as described in the section above, despite the knock-on effect that their location may have on other businesses (Wells and Watson, 2005). On the other hand, supermarkets are able to dedicate time and money

to research location before they apply for permits and have the capacity to develop premises to their own needs in many different geographical areas. The dynamic and dependent relationship between local authorities and supermarkets may explain why supermarkets are present in certain areas opposed to others. Supermarket presence in combination with other influential factors can explain how local food environments are used and the choices people make regarding food. There is clear evidence that local food environments are constructed as a result of political, social and economic drivers of the local government. The presence of supermarkets, in relation to other stores, is important in understanding the available food choices in terms of store and food type procurement. By measuring the local food environments of different local governments in different economic and social positions, my study then uses food intake and participatory data to understand how and why supermarkets are used and their implications on dietary intake.

1.2.2.2 Convenience Stores

There is evidence that in areas of low SES where supermarket prevalence is low, smaller convenience stores are more frequent (Morland, Wing and Diez Roux, 2002; Cummins and Macintyre, 2006b; Hoek and McLean, 2010; Thornton and Kavanagh, 2010). Convenience stores, as well as being more expensive, and by common definition, often store poorer quality and a smaller variety of foods for immediate consumption (Cummins and Macintyre, 2006b; Jetter and Cassady, 2006; Timperio *et al.*, 2008; Thornton and Kavanagh, 2010; Gallo, Barrett and Lake, 2014). As a result, convenience store presence is positively correlated with obesity prevalence (Block and Kouba, 2006a; Bennett, Wolin and Duncan, 2008; Gallo, Barrett and Lake, 2014), although other factors such as personal preference are also influential in choosing to use convenience stores.

Convenience stores, due to their size and by definition, are most common in areas in close proximity to where people live, opposed to supermarkets that are often found on larger developed sites. As a result, convenience stores are more accessible and 'convenient', in addition to having longer opening hours, for when it is not appropriate or possible to go to a supermarket or another store (Story, Neumark-Sztainer and French, 2002; Buckley, Cowan and McCarthy, 2007; Gallo, Barrett and Lake, 2014). Therefore, the presence of convenience stores within the local food environment provide an option to an individual, as the store can accommodate to time and travel pressures as well as other factors such as personal preference, budget and availability. In my study, the use of convenience stores is

assessed in relation to their presence and availability to households as well as their possible implications on dietary intake.

1.2.2.3 Fast Food Restaurants

Similarly to convenience stores, the presence of fast food restaurants (defined as prepared food purchased for immediate consumption (Gallo, Barrett and Lake, 2014)) have been correlated with increased rates of obesity and are most commonly found in deprived areas (Cummins, McKay and MacIntyre, 2005; Macdonald, Cummins and Macintyre, 2007; Thornton and Kavanagh, 2010). Macdonald et al. (2007) found evidence that fast food business models create a 'concentration effect', such that fast food companies purposely locate themselves within deprived neighbourhoods, capitalising on areas of low SES. Fast food restaurants provide energy dense foods at a low price and as a result can become preferred food types for areas of low SES (Cummins, McKay and MacIntyre, 2005; Macdonald, Cummins and Macintyre, 2007; Thornton and Kavanagh, 2010). In addition, it has been acknowledged that the presence of fast food restaurants in a given area reduced the intake of fruit and vegetables of people living in these areas (Thornton and Kavanagh, 2010). The relationship between the presence of fast food restaurants within local food environments of lower SES on dietary habits could help to explain the differences between food environments and food intake data of the four towns in the present study. Additional participatory data provides a means of investigating the reasons for fast food restaurant use as well as explain the differences in dietary habits which may be a result of, or a combination of related factors such as personal preference, affordability or dietary understanding in addition to the geographical availability of such stores.

1.2.2.4 Summary

The demographics of the area in which the local environment is situated have been shown to influence the food store types that are available and hence those which individuals are able to buy from. However, individuals are not confined to a particular census tract or neighbourhood and may encounter many food geographies throughout their day-to-day lives as well as actively travelling to others. Increased accessibility of alternative areas raises questions such as why people choose to use some stores and not others within their local food environment, why people travel outside their immediate food environment and what determines which foods are purchased within stores. These questions and

considerations can be evaluated by studying the complex system of the social, political and personal determinants of food choices, which together with aspects of the food environment will define household food choices and dietary outcomes. The present study uses sites that represent areas of high and low SES in two unitary constituency to assess the implications of local politics and affluence on store availability as well as other factors which create a complex system in determining food procurement and consumption choices.

1.2.3 Shopping and Consumption

Academic interest in the study of consumption and shopping grew as supermarkets and retail parks began to be commercially developed (Miller et al. 1998). Understanding why and how people shop and what influences what is purchased concerns sociologists, anthropologists and the business that is creating the commercial developments. The shopping experience, which is much more than merely purchasing products, has partly become a learned behaviour, which is a product of many economic, political, social and personal determinants (Miller et al., 1998; Miller, 2001; Wallop, 2013). Individuals must interact with store layouts, equipment (e.g. tills and trolleys) and store personnel. As such shopping is a social and cultural experience (Miller, 1998; Miller et al., 1998; Costa et al., 2013). Purchasing and procuring food is an intricate combination of many factors and often acts as a projected symbol of other aspects of an individual's lifestyle as well as their social and economic standing. As a result, the local food environment and store availability can not fully explain which, and why, stores are used nor does it explain the other factors, such as navigating the supermarket or projecting an individual's lifestyle through what they purchase, that are influential in the shopping experience and the procurement of food.

In his extensive body of work, Danny Miller (1998; 1998) argues that shopping decisions are based on an individual's social relations and standing, particularly influenced by household demographics and dynamics. Similarly, the work of Pierre Bourdieu explored the ideas of power within society and argued that food is one aspect used to distinguish individuals from other social classes (Bourdieu, 1984). Both Miller and Bourdieu argue that our behaviours including the way we shop or the foods we buy are due to our life experiences, culture and social positioning. Bourdieu introduced the concept of *habitus*, the idea that an individual's patterns, skills and dispositions are socially constructed and constrained. He argued that the world is perceived through *habitus*, which allows us to successfully

navigate the social environment. Nevertheless, *habitus* is not fixed and can shift over time and in specific contexts as it is created and reproduced unconsciously and therefore ideas associated with food and tastes can also alter and develop (Bourdieu, 1984; Hay, 1995). Bourdieu extended this in his work *Distinction: A Social Critique of the Judgement of Taste* (Bourdieu, 1984) to explore the idea that taste in art, clothing as well as food is a social construct. Particular tastes, he argues, are attributed to certain social classes, for example sweet, filling and fatty foods are associated with the working class as “a taste of necessity”. The idea of taste, in this theoretical way of thinking, is a middle-class concept as it allows for a ‘freedom of choice’, opposed to working classes where lack of choice results in tastes of “necessity” (Bourdieu, 1984; Wright, Nancarrow and Kwok, 2001; Skafida, 2013). Therefore, Bourdieu’s theory suggests that tastes are an indication of class as trends in consumption provide a vehicle to symbolise an individual’s social similarities, or distinctions. Where people choose to shop and the products they choose to buy are partly dependent on the social image that is associated with the areas, stores and products. Wallop (2013) has argued that shopping in Britain has reinforced social class divisions. Businesses, in particular supermarkets, that have the resources to do so, have exploited and reinforced the ideas of hierarchy, and adapted their stores and companies to exploit these ideals (Wells and Watson, 2005; Lindstrom, 2008; Wallop, 2013). The social perception associated with each store chain and products can drive individuals to choose certain stores and products over others, for purely social reasons, not nutritional quality or personal preferences. Therefore, shopping and consumption decisions, for example, where to shop, how to shop and what is purchased, are in part determined by the social class of the individual or household and may have implications for all members of the household. Shopping decisions can be translated into symbols of love, affection and sacrifice for the household and others within the immediate social network (Miller, 1998). Mothers are able to express love and affection by ‘treating’ their children, spouse and themselves through the act of shopping (Miller, 1998; Miller *et al.*, 1998). As a result, shopping and the decisions made during the act of shopping are much more than the procurement of services or items but are instead symbolic of other aspects of the shopper’s lifestyle and emotions.

The present study uses an analysis of local food environments alongside household participant data to assess the influence of shopping and consumption preferences on dietary habits. Geographic Information System (GIS) methods can only provide information about what is available not how the environment is used or why some stores and products are preferred over others. Therefore, long-term participant observation and qualitative research methods were specifically adapted for this study. I spent relatively short periods of

time doing fieldwork; 14 days in Barnard Castle, 5 days in Consett, 24 days in Tunbridge Wells and 8 days in Chatham. I used the principles of participation observation by talking and observing households, and also incorporated aspects of semi-structured interviews. This qualitative approach has allowed for an appreciation for the impact of consumption and shopping on nutritional outcomes. It has also provided an understanding of social relations and the other inter-related factors in families that create the complex system of food choice.

1.3 Food Choices

1.3.1 What are Food Choices?

Food choice is most commonly used to describe the determinants of food use (Nestle *et al.*, 1998; Neumark-Sztainer *et al.*, 2015). Why people choose certain foods over others is to understand 'food choices'. Food choices are a complex system of factors made at an individual, household and community level in addition to the relationship between each level. Choices involving food is the interest of multiple disciplines, for example psychology, anthropology, sociology and dietetics. My project is particularly focused on the significance of the geographical positioning of food stores influencing which stores people use, which foods they buy and how they are prepared, in comparison to other determining factors such as economic standing or education level.

1.3.2 Children's Food Choices

It has been established that eating habits are influenced from a young age and are likely to continue into adulthood (Burt and Hertzler, 1978; Olvera-Ezzell, Power and Cousins, 1990; Klesges *et al.*, 1991; Wang, Monteiro and Popkin, 2002; Timperio *et al.*, 2008; Holsten *et al.*, 2012). The role of peers, especially siblings of similar age, as well as commercial advertising are highly influential in food perceptions and preferences, which alongside personal attitudes and choices (Borah-Giddens and Falciglia, 1993; Gittelsohn *et al.*, 2000), can influence overall household dietary behaviours through pressure placed on parents from their children (Klesges *et al.*, 1991; Kirby *et al.*, 1995). As a result, certain food choices

are made by parents which may not have previously been made without the request from the children.

The vast number of potential factors, as discussed below, that can determine food choice and hence children's food choices is of particular relevance to this study that focuses on the food choices of families. By understanding the significance of factors that influence parental food decisions it is possible to understand or appreciate how children's dietary habits, both short and long-term, develop.

1.3.3 Food Choice Determinants

Individuals are biologically pre-disposed to prefer particular tastes and to avoid others as well as particular food related behaviours (Mela, 2006; Kittler, Sucher and Nahikian-Nelms, 2011). However, palatability of certain foods is predominantly an individually learnt behaviour and preference (Mela, 2006), which can be influenced by both cognitive and social factors (Neumark-Sztainer *et al.*, 2015). An individual's exposure to socio-cultural factors throughout their lives, from childhood to adulthood, will alter which foods are preferred and subsequently consumed.

Individual behaviours towards foods that motivate particular choices are in part psychological. The emotional response to a certain food can result in particular preferences, or rejection. Similarly, the attitudes attributed to particular foods, such as taste, smell and texture will cognitively determine which foods are 'acceptable' or preferred over others (Stroebele and Castro, 2004; Holsten *et al.*, 2012; Neumark-Sztainer *et al.*, 2015). Attitudes towards foods can also be socially determined. The social environment and context of an individual such as shared attitudes and beliefs will significantly influence which foods are chosen and preferred (Nestle *et al.*, 1998; Kittler, Sucher and Nahikian-Nelms, 2011; Pachucki, Jacques and Christakis, 2011). Therefore, preferred tastes and foods, which are both socially and individually constructed, determine which foods are sought and consumed. However, the accessibility, availability and affordability of preferred foods may restrict, or promote, their consumption, which my study assesses by measuring food availability, through GIS methods, and combines with participant observation and participatory mapping to examine the decisions made relating to food.

Anthropological work has emphasised the significance of food and food related activities to society (Richards, 1961; Douglas, 1972; Mintz, 1985; Scheper-Hughes, 1992; Lévi-Strauss, 1994; Mintz and Du Bois, 2002; Devereux and Griffith, 2003). While less anthropological work has been done on food consumption in 'developed' settings, Douglas and Nicod (1974) made an important contribution to the context of this study which studied the structure of the British meal. In their paper they identified in which they identified three distinctive types of the British meal, 1) a food event, 2) a structured event and 3) a snack. Douglas and Nicod (1974) also showed the distinction between a 'meal' and a 'snack' based on the potato/cereal dichotomy, such that a main 'family' meal is centred around the potato, opposed to other meals or snacks which are centred on cereals. The distinction between a 'meal' and a 'snack' is important in understanding what comprises and is considered a 'meal'. This distinction is especially relevant to understanding dietary routines within the home, such as the structure of some meals opposed to others as well as the implications for food intake data which assumes a common definition of a 'meal'. Collative data may be skewed if different understandings of a 'meal' are reported but not accounted for (Bingham *et al.*, 1994). The present study uses food recalls and ethnography in attempt to reduce this bias. By contacting respondents understanding the 'meal' or food event is used to appropriately class each 'meal' by type (breakfast, lunch, dinner or snack).

Whilst enough food is produced globally to feed the world's population (Latham, 2000; McMahon, 2013), the economic and political policies that underlie global food markets can significantly restrict the accessibility and affordability of high quality nutrition (Hoek and McLean, 2010). As a result, access to certain foods and food types is dependent on income (Khush, 2001). As income increases, individuals are able to afford higher quality foods with a greater variety of different food types (Redman, 1980; Bernstein *et al.*, 2010; Aggarwal *et al.*, 2011; Bittman, 2011; Rao *et al.*, 2013). A number of studies have shown that healthier diets are more expensive in the UK by up to £1.48 per day (£540 per year), although has also shown similar results in other countries such as the US, which is attributed to an increase in fruit and vegetable intake as well as higher quality meat consumption (Cade and Booth, 1990; Cade *et al.*, 1999; McDermott and Stephens, 2010; Rao *et al.*, 2013; Cassady, Jetter and Culp, 2014). Lack of availability of affordable food, therefore, has been shown to have significant implications on food choices and dietary outcomes, such that those of lower SES are more sensitive to food prices than those of higher SES (Andreyeva, Long and Brownell, 2010; Griffith, Lluberas and Luhrmann, 2013; Griffith, O'Connell and Smith, 2013). However, research has also shown that those of a lower SES with a poorer quality diet do not necessarily see money as a restriction and believe they are consuming an adequate diet

(Drewnowski, Darmon and Briend, 2004; Drewnowski and Eichelsdoerfer, 2009), which suggests that the socio-economic influences on education are also major determinants for dietary habits. Education is important in understanding what constitutes as a healthy diet in addition to providing the skills to prepare foods and how foods can be appropriately stored (Burt and Hertzler, 1978; Buckley, Cowan and McCarthy, 2007; McDermott and Stephens, 2010).

Furthermore, the economic activity within a household can be highly influential in relation to the time budgeted for food orientated activities. Where time is sparse, easily prepared foods will be favoured over those which take a longer time to make (Bove, Sobal and Rauschenbach, 2003; Buckley, Cowan and McCarthy, 2007; Gallo, Barrett and Lake, 2014). Time restraints are of particular relevance when looking at families. Time budgets are highly important and influential in lifestyle choices, such as food choices for families (Borah-Giddens and Falciglia, 1993; Skafida, 2012). The socio-economic status and economic activity of households can determine the availability, accessibility and affordability of food stores and types as well as the appropriate, preferred or most convenient means of food preparation and consumption.

1.4 Summary

The geographical food environment includes food stores that are available within a given micro-environment. The importance of access to stores in terms of infrastructure (e.g. roads, public transport links) and mobility (e.g. car ownership or access to public transport) suggests that proximity may not be the most significant determining factor to which store is used. Instead, other deciding factors can influence which food stores are used and which foods are purchased once inside a store, such as psychology, social networks and socio-economic status. The present study uses a system theory framework to evaluate the interaction and complexity of significant factors in order to assess the extent to which the local food environment is influential in determining dietary choices.

In the next chapter I will discuss the methodological approach I used in order to assess how the local food environment influences food choices in the four study sites as well as discuss the ethical considerations taken into account during the research. Chapter 3 displays the local food environments of the four study sites and discusses how the

environments differ as well as how they are used. In Chapter 4 I address the results that show the socio-economic influences on food choices and food related behaviours, as measure by household income and highest level of education. Chapter 5 examines the influences of family life and additional factors that were shown to be important in determining food choices and food related behaviours. Finally, Chapter 6 discusses the major findings and overarching themes from my research, in addition to evaluating the study, presenting recommendations of future research and providing the final conclusions of the study.

METHODS

In order to gain a comprehensive understanding of food environments and food choices I have combined four methods, Geographic Information Systems (GIS), food recalls, participant observation and participatory mapping. Food environments and subsequent dietary choices are a dynamic and complex system and require multiple datasets to appreciate the different aspects of the relationship. Each of the methods contributes to understanding the inter-related factors that play a role in food environments and food choices. Firstly, an understanding of the food environment of each site is required. In my study I used mapping techniques to assess the physical food environment. The implications of the local food environment on food choice require an appreciation of the actual food intake of the research participants, analysed in my study using food recalls. Participatory mapping was used to assess how the local food environment is perceived whilst adapting the traditional method of participant observation provided a means of assessing and identifying the underlying reasons for particular choices and behaviours. All of the methods used in my study have long been established and used in their respective fields and as such have become highly accepted as valid and appropriate methods for data collection. However, one method alone is incapable of providing a full appreciation for the relationship between food environments and food choices.

2.1 Study Sites

I chose Tunbridge Wells and Chatham in Kent and Barnard Castle and Consett in County Durham to represent different geographical areas of Britain as well as areas of affluence and deprivation. The geographical boundaries of each study site were defined by Middle Super Output Areas (MSOAs¹), government census area data that is used for small area statistics. Lower Super Output Areas (LSOAs), on average have 650 households or 1,500 residents and there are 34,753 in England. Middle Super Output Areas (MSOAs) cover a larger area than LSOAs with a minimum of 5,000 residents and 2,000 households. I chose MSOAs to represent the geographical boundaries for each town as MSOAs provide a more identifiable area for residents as local food environments than LSOAs, which only cover a couple of streets. In addition, MSOAs are generated using a cluster of LSOAs and can therefore later be reduced to smaller areas (LSOAs) if required.

There have been a number of GIS studies from sources such as Ordnance Survey, National Office for Statistics, local government and academic studies, that provide town boundaries, however, defining the study site boundaries can be challenging and inconsistent (Morland, Wing and Diez Roux, 2002; Thornton and Kavanagh, 2010). Some of the boundary databases that have previously been collected and developed use neighbourhoods, whilst others use towns, cities and some at county (or state) level. Boundaries are often defined using administrative units as given by councils or governments (Jetter and Cassady, 2006; Chaix *et al.*, 2012). However, administrative boundaries do not always represent the environment in ways that correspond with how the environment is actually used. Whilst administrative boundaries provide a basis for town boundaries, they are not necessarily the areas in which individuals associate themselves with (Thornton and Kavanagh, 2010). Instead, individuals use the local environment to meet their own needs and concerns, which is dependent on personal choice and aspects of availability such as cost or accommodating preferences or needs. In the present study I use both administrative boundaries (MSOAs) (Ordnance Survey, 2014) and qualitative techniques (participatory mapping) to assess the extent to which people associate themselves within the administrative boundaries and the implication that has on their food choices. Perhaps most important and relevant to my study is that, whilst GIS data provides an important overview of the local environment it cannot examine why people make the choices they do. In order

¹ Obtained from <http://www.ons.gov.uk/ons/guide-method/geography/products/census/spatial/2011/index.html>. Accessed 14th July 2015.

to fully understand how local environments are used and how, in turn, this influences food choices I used a mixed method approach to assess dietary choices in the four study sites.

Table 2.1 shows the demographic composition for each town, as a whole as stated by Office for National Statistics and not just the households in my study. Each MSOA across the country is assigned an Index of Multiple Deprivation (IMD) score by the Office of National Statistics, which is calculated using various data such as employment, education, housing, crime and income (Fryers, 2011). In order to illustrate IMD scores more clearly, I created a scale, (1 least deprived to 5 most deprived), which equally divided the IMD scores across the UK into five groups such that a value of 1 represents the one fifth of the least deprived MSOAs in the UK whilst a value of 5 represents the one fifth of MSOAs that are most deprived.

Table 2.1: Town demographics. Data obtained from Office for National Statistics (www.ons.gov.uk). This data represents each MSOA and not just the research households for this present study.

		Barnard Castle	Consett	Tunbridge Wells	Chatham
Local Authority		County Durham (unitary)	County Durham (unitary)	Tunbridge Wells (district)	Medway (unitary)
IMD Score Quartile		1	2	1	3
Population		7,040	11,457	18,043	8,279
Area (km ²)		9.13	6.17	7.28	2.68
Population Density (people per km ²)		771	1,857	2,478	3,089
Social Grade ² (%)	AB	22.71	14.23	42.55	13.79
	C1	28.88	31.97	33.86	31.94
	C2	20.76	23.47	12.55	18.32
	DE	27.65	30.32	11.04	35.95
Household Type (%)	One person	36.10	34.72	30.60	41.20
	Married; without dependent children	12.40	14.01	19.36	13.20
	Married; with dependent children	31.50	25.43	26.93	13.80
	Cohabiting couple; without dependent children	3.00	4.99	3.47	4.30
	Cohabiting couple; with dependent children	5.60	6.80	8.83	8.10
	Lone parent household	5.80	7.92	4.32	8.00
	Other	5.60	6.13	6.51	11.30

² Social Grade – a socio-economic classification used most in relation to market research mainly concerning consumer attitudes and habits. **AB**; Higher and intermediate managerial/administrative/professionals. **C1**; Supervisory, clerical and junior managerial/administrative/professionals. **C2**; skilled manual occupants. **DE**; semi-skilled and unskilled occupants, unemployed.

Table 2.1 continued

		Barnard Castle	Consett	Tunbridge Wells	Chatham
Deprivation Dimension³ (%)	None	43.06	43.78	56.67	30.78
	Deprived in 1 dimension	33.33	29.64	0.07	34.66
	Deprived in 2 dimensions	19.46	20.41	10.83	23.27
	Deprived in 3 dimensions	3.78	5.71	2.24	9.69
	Deprived in 4 dimensions	0.37	0.46	0.18	1.59
Car Ownership (%)	None	23.67	28.67	16.71	43.88
	1	49.17	44.20	49.94	41.42
	2	21.91	22.23	26.32	12.46
	3	4.08	3.73	5.19	1.73
	4+	1.16	1.16	1.84	0.50
Highest Level of Qualification⁴ (%)	None	22.76	24.93	12.84	21.70
	Level 1	13.87	13.60	9.60	14.42
	Level 2	15.53	16.89	5.29	15.60
	Level 3	10.45	4.63	12.00	14.34
	Level 4	24.40	13.52	44.21	21.31
	Apprenticeship	3.76	22.18	1.97	2.75
	Other ⁵	4.22	4.25	4.09	9.89
Economic Activity (%)	Employed (FT)	33.64	46.51	43.35	35.17
	Employed (PT)	12.94	12.95	12.38	10.87
	Self-employed (FT)	5.99	4.65	9.26	5.19
	Self-employed (PT)	2.29	1.31	4.67	1.58
	Unemployed	3.00	3.40	2.32	7.85
	Full-time student	2.33	2.43	1.97	6.35
	Retired	20.53	15.05	13.38	7.17
	Stay at Home	2.08	2.60	5.18	5.18
	Long term sick or disabled	3.56	5.90	2.04	6.05
	Other	13.63	5.22	5.45	14.58

³ Deprivation Dimension – there are four dimensions of deprivation which a household may or may meet. **Employment;** full-time student, unemployed or long-term sick. **Education;** not one person has at least a level 2 qualification nor a full time student. **Health;** long term health problems or self-reported 'bad health'. **Housing;** overcrowded, no central heating, shared dwelling.

⁴ See Table 2.2

⁵ Including Level 5 and above or qualifications from outside the UK that do not feature in Table 2.2

Table 2.2: British qualification levels

Level	Qualification Examples	Level	Qualification Examples
1	GCSEs (grades D-G) NVQ Level 1 First Certificate Functional Skills Essential Skills Music (grades 1-3)	4	Higher National Certificate (HNC) Certificate of Higher Education (CertHE)
		5	Higher National Diploma (HND) Diploma of Higher Education (DipHE) Foundation Degree NVQ Level 4
2	GCSEs (grades A*-C) O Levels (grades A-C) NVQ Level 2 National Certificate/Diploma Functional or Essential Skills Music (grades 4-5)	6	Degree with Honours (e.g. BA Hons, BSc Hons) Graduate Certificate Graduate Diploma Ordinary Degree (without Honours)
		7	Postgraduate Certificate Postgraduate Diploma Master's Degree (e.g. MA, MSc, MBA, MPhil) Integrated Master's Degree (e.g. MEng) Postgraduate Certificate in Education (PGCE) NVQ Level 5
3	A Levels (grades A-E) AS Levels Access to Higher Education Diploma Foundation Diploma (Art and Design) NVQ Level 3 National Certificate/Diploma International Baccalaureate (IB) Diploma Music (grades 6-8)	8	Doctorate (e.g. PhD, DPhil, EdD, DClinPsy)

2.2 Recruitment

Participants were recruited via schools, nurseries and mother and toddler groups in each of the four towns. I identified organisations and institutions from internet searches. Each organisation was sent a letter or email, addressed to the head-teacher, manager or co-ordinator. The letter contained an outline of the project, what participants would be asked to do and permission to contact the parents or guardians of their pupils or members. When replies were not received within two weeks of the original letter, there was a follow-up email or phone call.

To organisations that offered to help I sent the appropriate number of letters (based on the number of pupils enrolled in the school, nursery or group) to be distributed to parents and guardians. The letters also included an outline of the project as well as what was being asked of them, such as the processes involved in food recalls and participant observation,

time required and ethical issues such as confidentiality and the right to withdraw. They were offered two possible options for participation:

1. Food recalls
2. Food recalls, participatory observation and participatory mapping

Also included was a simple reply form, which asked for basic contact information (such as telephone numbers and email addresses) and in which option they would be willing to partake. The reply slips were then returned to their school or nursery office or group co-ordinator and sent back to me. In some circumstances, I visited the organisation and spoke to parents directly taking their contact information then.

Of the 70 organisations that were contacted, ten responded and of these six were willing to help. The schools that declined to help attributed this to time constraints or lack of interest. However, some schools were taking part in healthy eating programmes, such as Food for Life, and hoped that by taking part in the project they would be able to gain some credit towards such awards.

For those respondents that replied, I ensured that they met the inclusion criteria for the study. These criterion were that they lived within the study town and within the boundaries set by the MSOA used to define the study area (as described in section 2.1). Respondents were also required to have at least one child under the age of 10 years of age who predominantly lived with the respondent. By ensuring the child spent a significant proportion of their time within the household, I was able to ensure that there would be sufficient data recall data as well as allowing an appreciation for the household influences on the child's food choices but also at a household level.

Once I had one or more people willing to take part, they then advertised the project to their own social groups, acting as 'gatekeepers'. Using this recruitment method was very successful in recruiting most participants (Wanat 2008, Kawulich 2011) and was used in all towns. In some cases my initial contact, the 'gatekeeper' did not take part in the research. However, I had often already established relationships with other individuals so the research process was not hindered significantly. Blanton et al. (2006) define retention of participants as "activities used after enrolment that are directed at keeping participants engaged" (pg. 1522) and retention was maintained by regular contact with the participant as well as a quick transmission between recruitment and data collection, reducing the time

left to leave the project or to lose interest. In addition, using participants within a social group provided an unconscious 'social pressure' to remain with the study. Once potential participants had registered their interest in taking part, the study provided an 'activity' or topic for discussion that could be shared within the social group. In turn, the social aspect that the project provided reduced the number of participants who 'dropped out' and maintained a level of interest within the group. Some participants then became gatekeepers themselves by advertising the project to their other social groups such as at work or school groups, increasing the sample size.

I contacted all participants via social media (Facebook) and email, as telephone calls were deemed inconvenient in otherwise busy lifestyles. Social media (especially Facebook Messenger) provided a means of contact throughout the day via applications on mobile phones, which could be dealt with at a later convenient time. Telephone calls required a pre-set time, which were difficult for the mothers with young children due to unforeseen circumstances such as children's injury or behaviour. In addition, by providing access to online profiles between the participants and myself there was a sense of security and ease for us both when communicating and meeting in person, which helped develop more personal relationships.

Recruitment was particularly challenging and time consuming and resulted in many participants being recruited within social networks with similar lifestyles and socio-economic status. As a result, recruiting within social networks may have given a biased population in each town, which may not provide a true overview of the behaviours and attitudes of residents in each town. The difficult recruit also resulted in different sample sizes in each town, and there was a particular difference in participants recruited in Consett and Tunbridge Wells. Recruitment difficulties in Consett created time constraints and as a result only three households were included. On the other hand, recruitment in Tunbridge Wells was more successful with nine households, all of which were also involved in the participant observations. Therefore, the data collected from Tunbridge Wells is greater in numbers as well as depth, perhaps providing more reliable data to represent families in the town.

2.3 Geographic Information Systems (GIS)

In order to assess the local food environment, I used Geographic Information Systems (GIS) to visualise and analyse the geographical positioning of food purchasing sites (e.g. supermarkets, butchers, fast food restaurants and convenience stores) in each town. Stores selling food in the UK are legally obliged to register with the Food Standard Agency (FSA), which provided me with a database of all registered stores in each town, including store name and address. I visited each of the listed stores and collected the geographical position of the store entrance using QStarz Travel Recorder XT (BT-Q10000XT). Some stores included on the database were no longer in business and as such their geographical position was not collected. On the other hand, some stores, were not included in the database but were discussed whilst participants sketched their local food environments and when talking to participants. I later visited these stores to collect their position. Each store was recorded as a point of interest (.poi) data point, documenting the longitude and latitude, using the co-ordinate system WGS 1984. The .poi data files were imported into QTravel, the compatible software for the QStarz Travel Recorder XT (BT-Q10000XT) and extracted as comma separated files (.csv). I then named and coded each set of co-ordinates. I coded stores using a binary coding system for different food types (e.g. fresh vegetables, frozen vegetables, alcohol) and where they were present were coded '1' and where absent '0'. Depending on which food types were present and which were absent, each store was classified (see Table 2.3 for full classification criteria of store categories). The categorisation of stores was particularly important and influential in the statistical density analysis using ArcGIS. The binary system used in my project does not necessarily distinguish fully between similar store types, such as differentiating between small and larger supermarkets. For example, in Barnard Castle, the two supermarkets Co-Op and Morrison's differ in size and as such some residents describe the smaller Co-Op as a 'convenience store' opposed to a supermarket. Similarly, the binary classification system did not necessarily distinguish between fast food restaurants and cafes. For example, some independent cafes are defined as fast food restaurants and vice versa and therefore do not necessarily truly represent store availability in the town. The binary classified store category was used in GPS analysis for consistency between towns for the geographical analysis, whilst participant defined store types were also used in the observational analysis.

Once I had classified the stores into a comma separated file (.csv), as a table, I imported this file into ArcMap 10.0 as an attribute table. Middle Super Output Area (MSOA)

geographical data (obtained from Ordnance Survey 2014) was also imported to show study site boundaries. Base maps were imported from ESRI ArcGIS to show streets and other identifiable features such as railways and rivers. ArcMap 10.0 was then used to statistically analyse the GIS data. Analysis included point density for each town which creates a layer that classifies the points on a continuous scale of areas most dense to least dense. ArcGIS does this by statistically calculating whether the points, and those surrounding, are significantly clustered. Store density analysis data were then compared qualitatively to participant maps and data from conversations with participants such as defining 'town centres' and main areas for shopping and food procurement.

Previous academic research has shown that although a relationship may be identified between the geographical food environment and particular dietary behaviours, it is difficult to determine its causal direction. Whether it is the presence of particular stores in a geographical setting that has introduced (or maintained) choice behaviours or instead demand that has driven the presence of certain food stores or whether the food landscape has driven individuals to reside in the area, is often difficult to determine (Thornton and Kavanagh, 2010). My study used a number of methods in an attempt to begin to shed some light on the characteristics of the food environment and whether residents actively choose to use stores or instead use what is available. In addition, other possible related factors that may also influence how the food environments are accounted for shedding further light on subsequent food choices.

Table 2.3: Store classification criteria. ☐ symbolises that the product must be definitely be present within the store to be classified as such store type (i.e. binary code of '1'). Those stores that did not fall into any of these categories were classified as 'Other'.

Store Type	Frozen Vegetables	Fresh Vegetables	Organic Vegetables	Frozen Fruit	Fresh Fruit	Frozen Meat	Fresh Meat	Precooked Meat	Fast Food	Bread Products	Tinned Foods	Fizzy Drinks	Alcohol	Fruit Juices	Microwavable Meals	Confectionary	Biscuits/Crisps	Bakery Products	Cereals	Cooked Meals
Hypermarket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supermarket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Convenience						<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fast Food									<input type="checkbox"/>			<input type="checkbox"/>								
Restaurant												<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>				<input type="checkbox"/>
Cafe												<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Bakery										<input type="checkbox"/>					<input type="checkbox"/>			<input type="checkbox"/>		
Butcher							<input type="checkbox"/>													
Del/greengrocers	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>																
Confectionary												<input type="checkbox"/>				<input type="checkbox"/>				

2.4 Food Recalls

I used food recalls to provide quantitative data on the dietary intake of households, and individuals within households. In turn food intake data were used in comparison with GIS data to assess whether the geographical positioning and presence of particular food stores correlates to dietary habits. Food recalls took place in each household over seven consecutive days, which represent typical consumption (i.e. not a holiday or special occasion) via telephone (52% of participants) or Facebook Messenger (48% of participants), an instant messenger tool, similar to email. A convenient time for each participant was discussed at the beginning of data collection and this time was used for most days to collect information. With respondents I phoned, I would ask for the respondent, most commonly the mother of the household, to spontaneously recall what each member of the household had consumed (food and drink) during that day (or anything consumed in the previous evening which was missed from the call the previous day). I would then revisit each meal for each household member and ask specific questions such as 'did you make that yourself?' 'where did you buy that from?' or 'which brand did you use?' This information, may not have been included, or otherwise missed, by other methods such as food diaries. For each meal or food consumed, I also asked for information on the relative portion sizes (Bingham *et al.*, 1994; Wrieden *et al.*, 2003) and between household members. For example, for a home cooked meal of spaghetti bolognese, I would ask the weight of the mince used, what proportion of the packet of spaghetti was used, how many mushrooms and relative portion sizes between members within the household. In addition, how each meal was prepared, such as cooking techniques, added ingredients (such as salt or sugar) and where each food item was purchased was also asked and recorded in order to provide a most accurate overview of food preparation techniques. Similar methods were employed for those where recalls were conducted via Facebook Messenger. I would send the respondent a message asking them to type their households dietary intake for the day. I would then read and review the reply and probe further on other missing details, similar to the telephone calls. For example, I would ask where were the foods purchased, consumed, portion sizes and clarify any differences between household members as well as cooking methods. Upon the respondents reply I would then ensure all of the required details were collected in full. In some circumstances, respondents would also send pictures of recipes, ingredients or an image of the meal for reference.

Each meal was broken down into the particular foods that were included and each food type was assigned a 'food code', as given within the data tables. For example, a sandwich was coded for the bread, butter and each individual filling. In attempt to provide consistency amongst reported portion sizes, I also provided each household with pictures of different portion sizes (see appendix 1). These pictures contained known volumes and masses of different foods and drinks. Participants could then select which image best represented the portion size consumed by each household member for more accurate data. Otherwise, portion sizes were attributed to each food type based on details provided by the respondent. This would either be number and size of particular foods (e.g. number of tomatoes used) or more specific weights given on the food packaging. Where the number and relative size of each foods were given the average weight of these foods was taken to calculate the nutritional value. Average mass of foods was provided by data published by Tesco.com. For each meal, the number of portions of fruit, vegetables, fizzy drinks and alcohol were recorded based on the information provided by the respondent. Portions of fruit and vegetables were determined by portion sizes defined by the NHS (2015). One portion of fizzy drink was defined by 500ml of any sweetened beverage and one portion of alcohol was defined as 25ml of a spirit, 500ml of beer or cider and 175ml of wine. Each meal was also coded for whether or not it was fast food / prepared foods or consumed outside the home. I also asked each household for demographic data such as children's ages, household income band, number of cars owned within the household and highest level of education of adults living in the home to use to statistically analyse relationships between demographic factors and food intake.

Statistical analyses were conducted using SPSS 20.0. Food recall data were tested for normal distribution using a Shapiro-Wilks test. As the data were not normally distributed (Shapiro-Wilk $p < 0.05$), Kruskal Wallis tests were used as a non-parametric method to test significance between multiple groups, as the assumption of data normality is not required. Kruskal Wallis tests were used to analyse the portions of vegetables, fruit, fast food/prepared foods, fizzy drinks, alcohol as well as food consumed outside the home between variables such as town, household income and car ownership which were collected from each household in my study. Further Tukey post-hoc analysis tests were also conducted in order to provide specific information on which means are significantly different from each other. Statistical analysis of food recall data was only conducted for the mother of each household. As the households who took part in the study varied in size and

of the ages of household members, it is difficult to statistically compare food intake at a household level. For example, some households had six members, whilst some only had three. Furthermore, some households had younger children who naturally eat less than older children and adolescents. Therefore, by comparing data at household level may be biased towards larger households or households with older children. Consistently, amongst households in all towns the mother of the household was present and therefore food intake data relating to the mother is more comparative amongst households and between study sites. Moreover, as it was the mother who provided the information for the food recalls in all study households, this data is likely to be most accurate as it does not necessarily rely on second hand recall by asking partners or children to remember what they had eaten during the day. Nevertheless, the food recall data for the rest of the household is equally important and therefore, further to the statistical analysis I then qualitatively assessed the food recall data to assess any trends observed in the data between household members or between households. These findings are presented qualitatively to complement the statistical findings from the mother's food intake.

2.5 Participant Observation

Combining Geographic Information Systems (GIS) and food recalls allow for the limitations of food recalls to be addressed. In turn, however, the generalisation of GIS and participatory mapping methods can be placed within a broader social context by using participant observation. Participant observation provides a means of evaluating how and why decisions are made and the social factors that drive these decisions. Understanding the complex system of how and why food related decisions are made allowed the quantitative GIS and food recall data to be conceptualised within the social environment by using traditional qualitative and anthropological techniques.

I adapted the traditional method of long-term fieldwork to tailor for the needs of my project. Spending extensive time with one family would have been impractical and inconvenient and within the time frame of my project, it would have been impossible to meet as many families in each town. As a result, I have combined aspects of participant observation and unstructured interviews. In a scheduled time to sit and speak to participants, in an interview-like setting, I asked about food choices and the stores available in their town. In addition, I paired interview-like style of data collection with observations of shopping and

cooking using participant observation techniques. By combining semi-structured interviews and observations it allowed a deeper understanding of the daily workings of households in each study site, whilst still gaining data on food choices and behaviours. The semi-structured interviews focused on three major themes: household purchasing, household consumption and local environments. I used an interview guide (see appendix 2) to direct the conversations but were not necessarily followed strictly. The number of households analysed was of a much larger sample size than if participant observation methods had been followed strictly.

Furthermore, the adapted ethnographic approach provided a convenient compromise for participants who themselves had time constraints as a result of having young families. In turn, reducing the time constraints increased the number of families willing to take part, due to the reduced involvement that was required. The combination of ethnographic methods of interviewing and participant observation allowed me to achieve a larger sample for the project than would have been possible through extensive, ongoing, in-depth observations. At the same time I was able to build close relationships with participants that helped me to explore their food choices and understand the lived reality of their food environments.

Participant observation sessions took place within the participant's home, often during food preparation, at local supermarkets, accompanying them during food shopping trips or in coffee shops, whichever was most comfortable and convenient for each participant. The sessions often followed a common structure, whereby they would begin with a general conversation allowing the participants to get to know me and vice versa. Then general questions based on food shopping habits were asked, normally 'where do you buy most of your food?' and then by following themes and ideas which arose during such questions particular topics were dealt with, in a conversation like manner. A notebook was used to record important ideas as well as an audio recorder being used in most instances. I met all the participants on more than one occasion, often twice (68% of households) or three times (32% of households).

After each interaction with the respondents, I collated my notes and recordings, which were then word processed and transcribed. During this process of writing up notes, I highlighted particular or interesting comments and quotes. I used the major overarching themes identified in the discussion guide (see appendix 2) as a basis for identifying themes that emerged from the qualitative discussions. Themes that overlapped different areas such as

household purchasing and consumption were identified and elaborated upon. Differences between the insights from households and study sites were extracted and investigated in a thematic manner and reviewed to ensure they fit within the data before being defined. Identified and extended themes were then related back to the research questions and grouped accordingly.

2.6 Participatory Mapping

The ‘actual’ food environment, measured in my study using Geographic Information Systems (GIS), does not always equate to how the local food environment is perceived and in turn used. Therefore, I used participatory mapping in order to collect qualitative data to assess individual perceptions of their spatial environment in relation to GIS and participatory data. Participatory mapping and GIS provide a full understanding of how the local environment is both constructed, understood and the underlying factors that influence how it is used. Participatory mapping was used to compare the participant’s perception of their own food environment in relation to the ‘actual’ environment obtained from GIS data. In addition, participatory mapping also provided me with a list of stores used by each participant. During meetings with participants, they were asked to map, on a blank piece of paper, their ‘food environment’. This was the only instruction given, unless participants asked for further aid. When participants did ask for further guidance, they were asked to map where they interacted with food. The mother of the household was the most likely to have completed the participant maps, however, where possible, spouses (or partners) and children were also asked to map their ‘local food environment’ as means of comparison.

Participant maps were analysed qualitatively by comparing them to the conversational and observational data. Ideas and topics, which were discussed in conversations and observations of the household, were correlated to the mapping exercise as to how local food environments, and their environment in general are perceived. Which stores were included, indicated what was considered a food purchasing site and the inclusion of other areas other than the town itself suggested that food environments extended the boundaries of each town. Furthermore, the concepts and ideas that came to light through participatory mapping were then included in a comparison to GIS data that showed the ‘actual’ food environment.

2.7 Ethical Considerations

This study was approved by Durham University Anthropology Department Ethics Committee and follows the ethical guidelines of ASA (Association of Social Anthropologists of the UK and the Commonwealth). Conducting research with human participants requires acknowledgment of the ethical implications of the methods used, the nature of the research topic and the impact the research may have on researchers, participants and research councils (Jorgensen, 1971; ASA, 2011). These implications may address issues such as personal safety, legality as well as psychological wellbeing of both participants and researchers. For researchers, personal ideas and beliefs, which are present throughout the research process, including research design, participant recruitment, data collection and in writing, may conflict with the best interests of their participants (ASA, 2011). Research councils and institutions have published a number of ethical guidelines in attempt to provide a framework for all anthropologists to use during research. In social anthropological research most follow the guidelines published by the Association of Social Anthropologists for the UK and Commonwealth (ASA) (ASA, 2011), which my study implements.

The study aims of my project required the exploration of some potentially intrusive topics such as diet, health and finance. As such, particular care was given during participant observational settings. When discussing such topics, confidentiality and anonymity are paramount as well as the right to withdraw or refuse to discuss particular topics. As a result, the Data Protection Act was applied, as a part of the ethical clearance of my study. In addition, in accordance to the ethical guidelines of the ASA, participants in my study were given an Information Sheet and Consent Form, which outlined the aims and methods of the study, what was expected of the participants as well as how issues such as confidentiality and anonymity would be addressed (ASA, 2011). Consent forms required a signature of one member of each household, often the mother; however, verbal consent was frequently reconfirmed throughout data collection.

Nevertheless, in certain field sites used in my study, literacy and education rates are particularly low among adults (Nomis, 2014). As such, a revised consent form and information sheet was required in order to ensure that these participants were aware of the project and what their participation involved before signing the consent form. In addition to the revised information sheets and consent forms, these were also read aloud, to all

participants in all study sites, as well as being discussed in lay terms with each participant at the beginning of data collection.

When working with children, there were particular factors that needed to be considered, such as consent and the child's wellbeing. Whilst the participation of children (under the age of 18 years) is to the discretion of the participating parents (who would have signed a consent form), in the event of the observing or suspecting abuse or neglect, these issues would have been raised with the project's supervisors. In the case of a child's, or any individual's, health being at immediate risk, emergency services would have been contacted.

Implications of confidentiality and anonymity are then extended into the protection of the study's results, post data collection. In particular, issues associated with the field notes, in terms of who has access to them and confidentially, such as using names or identifying features of certain participants. Whilst field notes did include identifiable indicators to each participant, although these were not necessarily names, all notes were kept in password-protected documents on a personal and password-protected computer. In relation to access to my field notes, access was limited to supervisors and to the participant in which the notes were associated with.

Furthermore, as with any research that requires fieldwork, issues of health and safety for both the participants and researchers, are pivotal. When working in a participant's home, there are a number of risks, such as travel to and from sessions, working alone and personal safety in study sites. Health and safety issues were addressed in the risk assessment, which was an important part of the ethic committee's decision for ethical clearance. The major issues, as described above, were primarily addressed by ensuring frequent contact (via telephone) was maintained including acknowledging the arrival at the site and then again when returning to a 'safe environment' away from the study site. In addition, any issues that arose during participant observational sessions were discussed with supervisors as soon as possible.

2.8 Summary

Each method used in my study was purposefully selected to give a holistic overview of the complex system of food environments and food choices. The four methods have previously been used in food choice and environment research but alone cannot provide the appropriate data to sustainably answer the research questions. As a result, the combination of these four methods (GIS, food recalls, participatory mapping and participant observation), utilises the strengths of each approach to understand the complex effect of food environments on food choices.

HOW DO LOCAL FOOD ENVIRONMENTS DIFFER? HOW DO PEOPLE USE THEIR LOCAL FOOD ENVIRONMENT?

This chapter discusses the differences between the local food environments of the four study sites and how participants in this study use their local food environments. Previous research has shown that local food environments define which stores are available and accessible and therefore the stores that are used as well as the foods that are purchased and consumed (Glanz *et al.*, 2005; Thornton and Kavanagh, 2010; Caspi *et al.*, 2012). The presence of specific store types such as supermarkets and convenience stores within a local food environment are associated with certain dietary behaviours (Morland, Wing and Diez Roux, 2002; Block and Kouba, 2006b; D'Costa, 2012; Gallo, Barrett and Lake, 2014), for example increased fruit and vegetable consumption has been found in areas with close proximity to a supermarket (Pearson *et al.*, 2005; Cummins and Macintyre, 2006a; Chaix *et al.*, 2012). Therefore, by quantifying the local food environment, using Geographic Information Systems (GIS) methods I am able to provide an overview of the availability and accessibility of foods in the four study sites. Combining the quantitative and geographical understanding of the local food environment with participatory data from participant observation and participatory mapping I discuss how the differences between environments influence how they are used and the subsequent dietary choices.

I conducted research in four towns (Tunbridge Wells, Chatham, Barnard Castle and Consett) between December 2014 and January 2016. Food recall data were collected in 25 households (111 participants). Participatory data (participant observation and participatory mapping) was carried out in 20 of the same households (see Table 3.1). Tunbridge Wells had the largest sample size with nine households (37 individuals) involved in both food

recall and participant observation. Only three households in Consett were recruited for the food recall aspect of the study and only two of the three households in Consett took part in participant observation and participatory mapping. Food recall data, in all four towns was collected over seven consecutive days from a parent within the household, all of whom were mothers. In households that had agreed to also take part in participant observation I visited them on at least two occasions in the home, coffee shops or supermarkets depending on what most convenient and preferred for the respondent. Participant observation tended to be spread across a two week period and in 80% of households in my study an additional household member such as a spouse or children were also included in participant observation.

Within the four study towns, a total of 474 food stores were recorded (see Table 3.2) where the most stores were recorded in Tunbridge Wells ($n=195$) and the least in Barnard Castle ($n=54$). However, store density (stores per km^2) shows that Chatham has the highest density (41.8 stores/ km^2) and Barnard Castle with the lowest (5.9 stores/ km^2) (see Table 3.2). The most prevalent stores were fast food outlets in Barnard Castle ($n=12$, 22.2%), Consett ($n=21$, 33.9%) and Chatham ($n=35$, 31.2%) and restaurants in Barnard Castle ($n=12$, 22.2%) and Tunbridge Wells ($n=96$, 49.2%).

Table 3.1: Households per study town

Town	Number of households (<i>n</i>)	Modal household size	Household Size Range	Total number of participants			Food Recalls		Participant Observation/ Participatory Mapping (Households, <i>n</i>)
				Total (<i>n</i>)	Adults (<i>n</i>)	Children (<i>n</i>)	Households (<i>n</i>)	Participants (<i>n</i>)	
Barnard Castle	7	4	4-6	33	14	19	7	33	5
Consett	3	4	2-8	11	5	6	3	11	4
Tunbridge Wells	9	4	3-6	37	18	19	9	37	9
Chatham	6	5	3-6	30	9	21	6	30	2
TOTAL	25			111	46	65	25	111	20

Table 3.2: Number of store types per town and percentage of store type in each town. Table also shows food store density (store/km²) in each town.

Store Type	Barnard Castle		Consett		Tunbridge Wells		Chatham	
	<i>n</i>	% of stores in town	<i>n</i>	% of stores in town	<i>n</i>	% of stores in town	<i>n</i>	% of stores in town
Hypermarket	0	0.0	0	0.0	1	0.5	0	0.0
Supermarket	2	3.7	3	4.8	6	3.1	2	1.8
Convenience	3	5.6	7	11.3	14	7.2	9	8.0
Fast Food	12	22.2	21	33.9	26	13.3	35	31.2
Restaurant	12	22.2	6	9.7	96	49.2	15	13.4
Café	11	20.4	8	12.9	23	11.8	13	11.6
Bakery	2	3.7	2	3.2	4	2.1	2	1.8
Butcher	3	5.6	2	3.2	3	1.5	5	4.5
Deli/greengrocers	1	1.9	2	3.2	3	1.5	0	0.0
Confectionary	4	7.4	0	0.0	3	1.5	4	3.6
Other	4	7.4	11	17.7	16	8.2	27	24.1
TOTAL	54		62		195		112	
Town Size (km²)	9.13		6.17		7.28		2.68	
Store Density (store/km²)	5.9		10.0		26.8		41.8	

Stores in all towns were particularly dense in the high streets and the town centres (see Figure 3.1 to Figure 3.4). Stores in Barnard Castle are predominately located within the town centre (see Figure 3.1) whereas in Consett they are a little more widespread around the town (see Figure 3.2). Tunbridge Wells has two particular areas of high density, the large shopping centre and surrounding areas and the High Street and colonnade areas further south in the town (see Figure 3.3), whilst Chatham's food stores are concentrated in the High Street (see Figure 3.4).

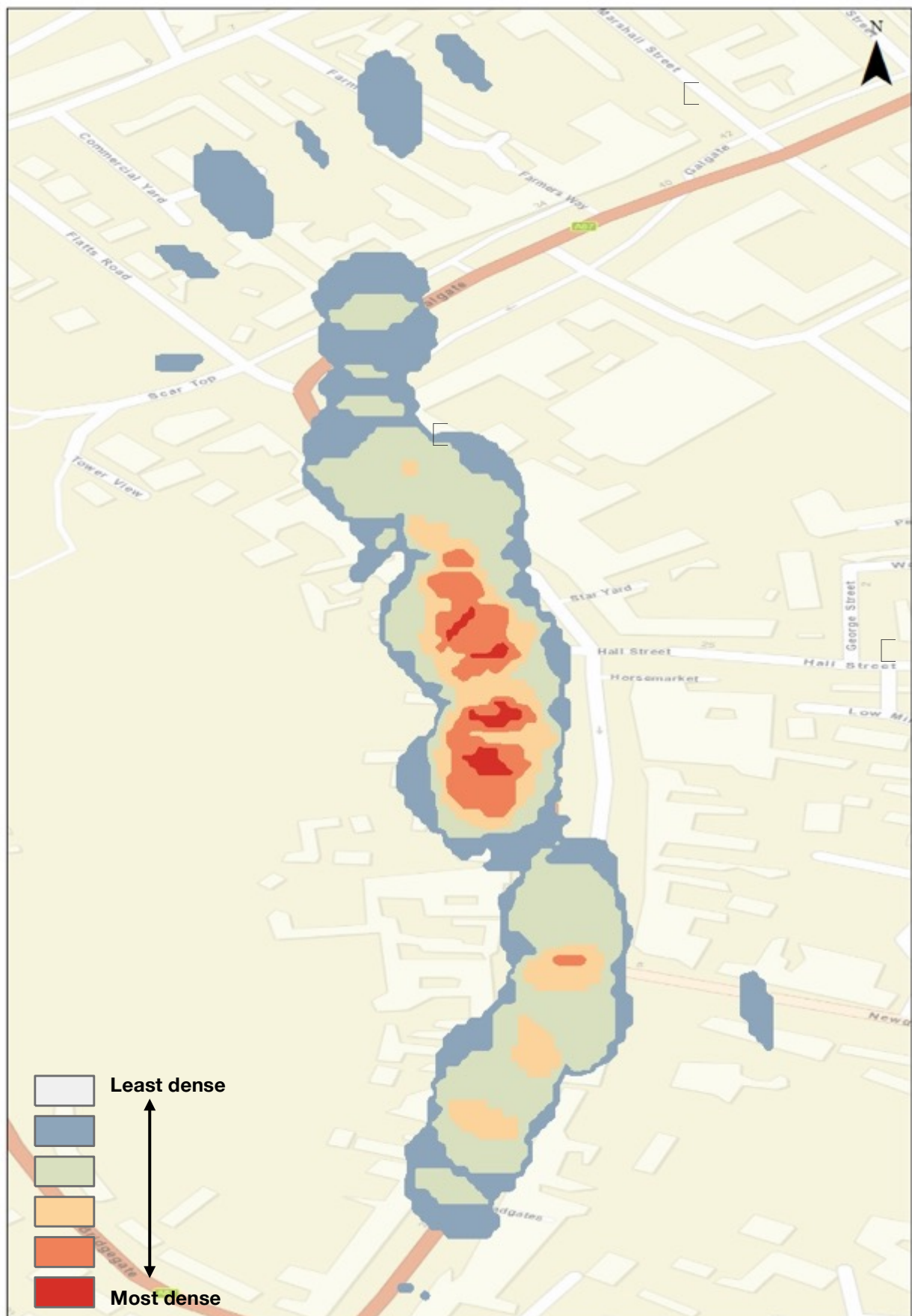


Figure 3.1: Food store density in Barnard Castle. Areas coloured red highlight the most dense areas in terms of the presence of food stores. Blue to white areas represent the least dense areas of food stores. □ represent the general area where participants from my study live.

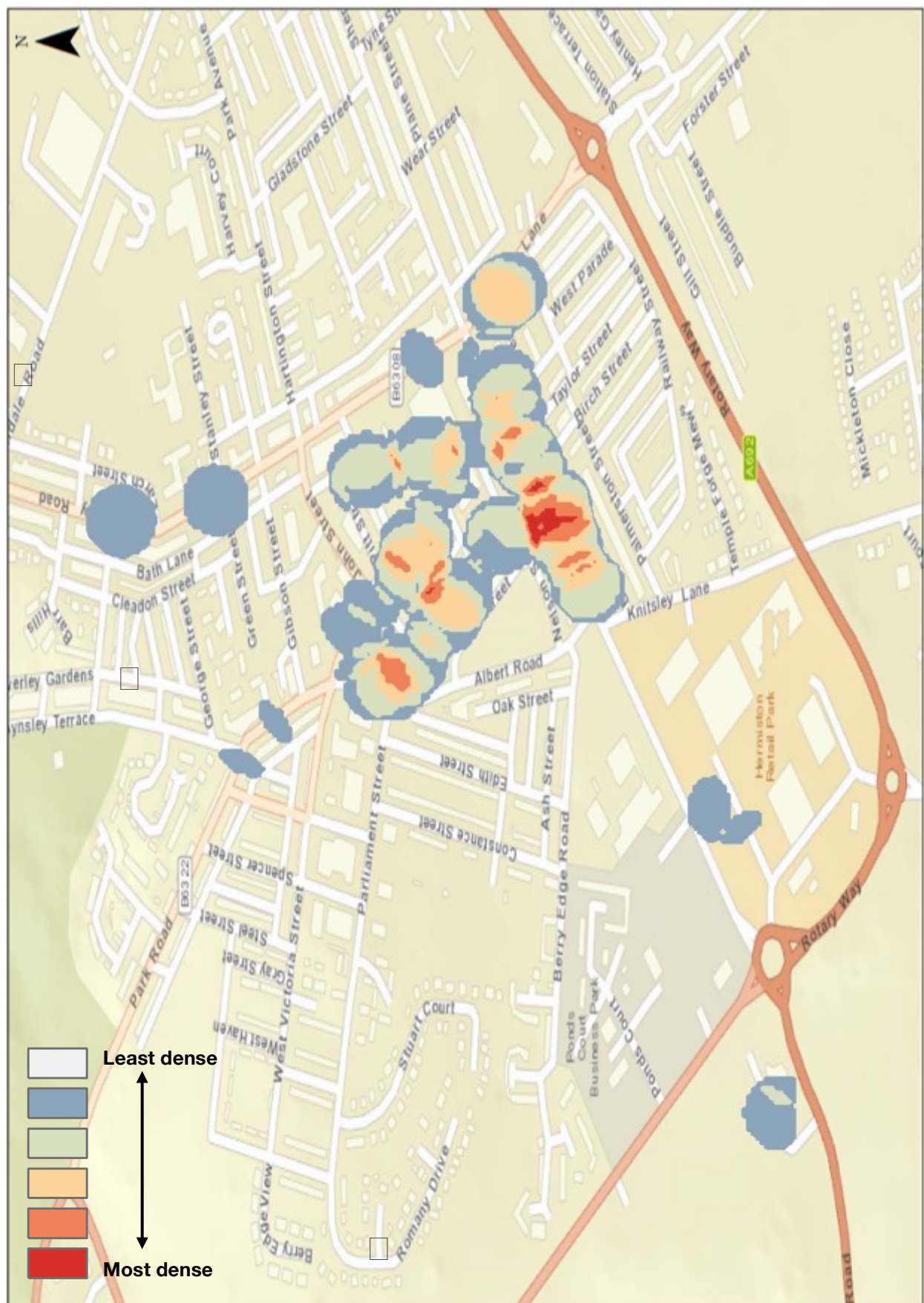


Figure 3.2: Food store density in Consett. Areas coloured red highlight the most dense areas in terms of the presence of food stores. Blue to white areas represent the least dense areas of food stores. □ represent the general area where participants from my study live.

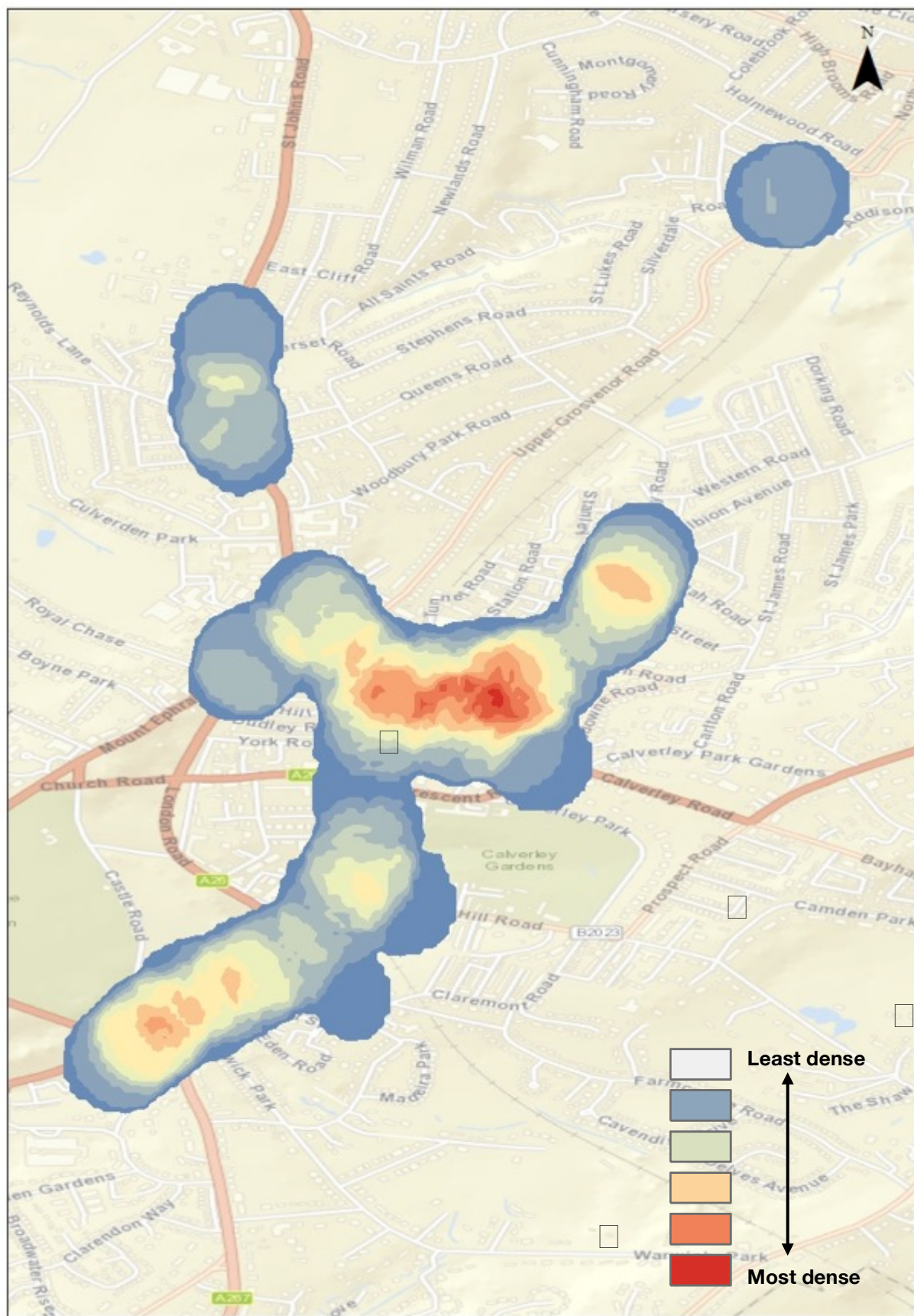


Figure 3.3: Food store density in Tunbridge Wells. Areas coloured red highlight the most dense areas in terms of the presence of food stores. Blue to white areas represent the least dense areas of food stores. □ represent the general area where participants from my study live.

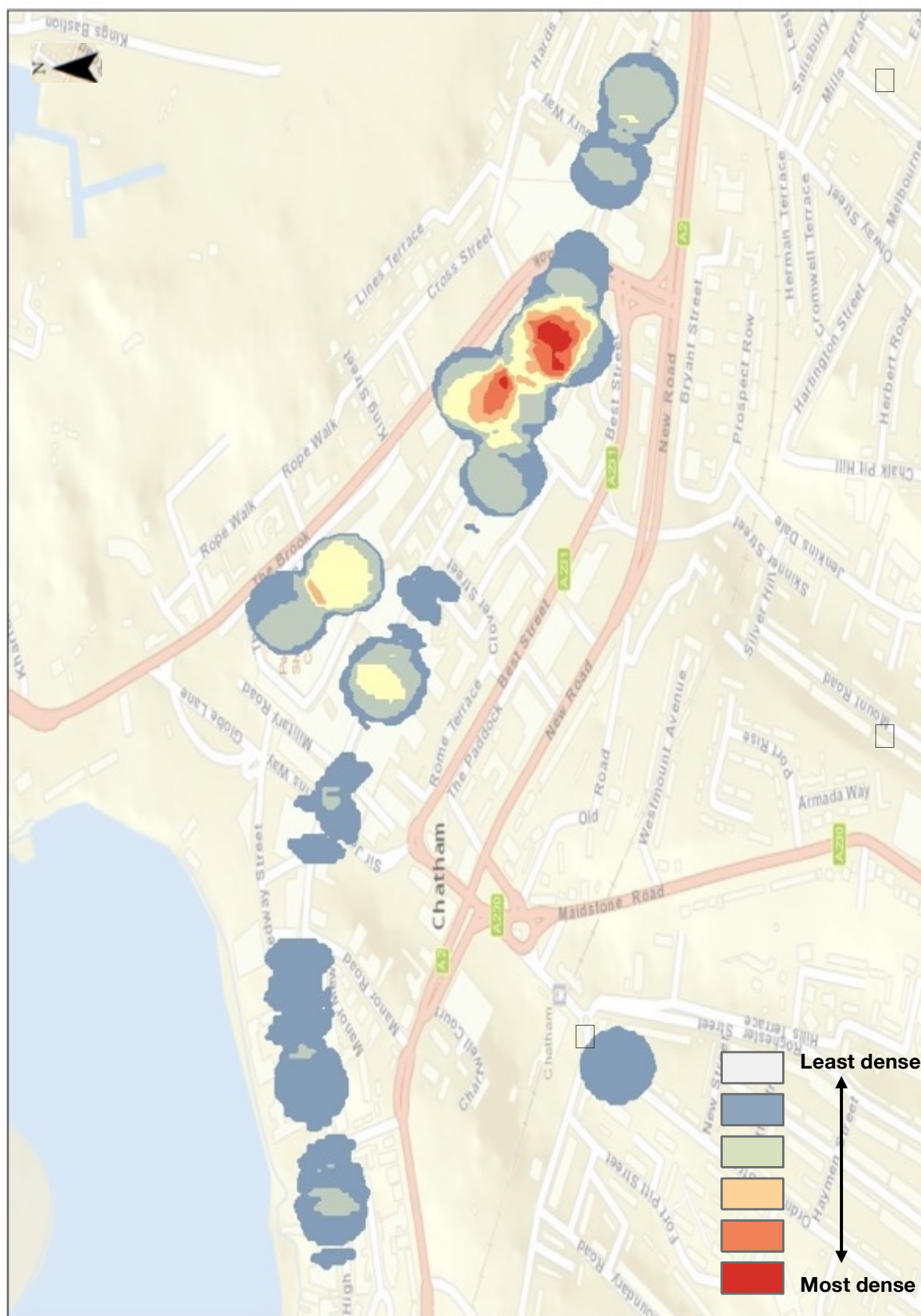


Figure 3.4: Food store density in Chatham. Areas coloured red highlight the most dense areas in terms of the presence of food stores. Blue to white areas represent the least dense areas of food stores. □ represent the general area where participants from my study live.

The number and type of stores available determine the types of foods available in each food environment (see Table 3.2). Twenty different food types were binary coded to classify stores (see Table 2.3), but also to show the availability of the food types between towns. The most common food type in all towns is fizzy drinks (Barnard Castle $n=49$, 90.7%, Consett $n=64$, 91.4%, Tunbridge Wells $n=209$, 95.9% and Chatham $n=125$, 94.7%), with the least prevalent being frozen foods such as fruit, vegetables and meat in all towns except Chatham where organic vegetables were the least common ($n=3$, 2.3%) (see Table 3.3). There is a dynamic relationship between the availability of food stores and particular food types and how a local food environment is actually used. In turn this influences which foods are eaten (see Table 3.2 and Table 3.3) as well as nutrient intake.

The food recall data shows that fruit and vegetable consumption was greater in the two towns of affluence (Barnard Castle and Tunbridge Wells) (Kruskal Wallis test; Fruit $X^2(3) = 41.613$, $p<0.001$; Vegetables $X^2(3) = 55.810$, $p<0.001$) whilst consumption of fast food/prepared foods and fizzy drinks was greater in Consett and Chatham (Kruskal Wallis test; Fast food/prepared foods $X^2(3) = 69.233$, $p<0.001$; Fizzy drinks $X^2(3) = 21.688$, $p<0.001$) (see Table 3.4). Tukey HSD post-hoc analysis suggests that the significance is associated between all towns. Analysis of the meals consumed outside the home shows that Tunbridge Wells and Chatham, both in county Kent, had higher levels of consumption compared to Consett and Chatham, although the differences between towns are not significant. Finally, food recall data also shows that alcohol consumption was greatest in Tunbridge Wells and Chatham than the other towns (see Table 3.4). Qualitative assessment of the food recall data from the other household members also follows a similar trend, whereby spouses and children consumed on average a greater number of portions of fruit and vegetables in Barnard Castle and Tunbridge Wells but lower levels of prepared foods and fizzy drinks. Across all households in all towns, there is also a greater intake of fruit and vegetables amongst children compared to their parents, although this is greater in the more affluent towns. This is likely due to the greater importance parents put on their children's diet and health compared to their own, therefore ensuring children are consuming fruit and vegetables (see Section 5.9). With regards to consumption of fizzy drinks this is greatest amongst children (especially adolescent children) and then spouses with mothers seeming to have the lowest level of intake. This intake is particularly driven by the use of fast food restaurants and confectionary stores as social venues for adolescents and the likelihood of spouses to consume fizzy drinks during lunch breaks at work. Furthermore, food consumed outside the home is predominantly consumed by parents as a significant aspect of adult social life (see Section 5.5).

Table 3.3: Number of stores that sell food types in each town and percentage of stores in each town.

Food Type	Barnard Castle		Consett		Tunbridge Wells		Chatham	
	Number of stores (n)	% of stores in town	Number of stores (n)	% of stores in town	Number of stores (n)	% of stores in town	Number of stores (n)	% of stores in town
Frozen Vegetables	3	5.6	6	8.6	12	5.5	6	4.5
Fresh Vegetables	5	9.3	8	11.4	43	19.7	16	12.1
Organic Vegetables	4	7.4	7	10.0	18	8.3	3	2.3
Frozen Fruit	3	5.6	6	8.6	12	5.5	6	4.5
Fresh Fruit	6	11.1	19	27.1	59	27.1	20	15.2
Frozen Meat	3	5.6	6	8.6	12	5.5	6	4.5
Fresh Meat	6	11.1	10	14.3	27	12.4	54	11.4
Precooked Meat	11	20.4	18	25.7	28	12.8	38	28.8
Fast Food	32	59.3	53	75.7	96	44.0	97	73.5
Bread Products	13	24.1	22	31.4	38	17.4	40	30.3
Tinned Foods	9	16.7	15	21.4	30	13.8	38	28.8
Fizzy Drinks	49	90.7	64	91.4	209	95.9	125	94.7
Alcohol	19	35.2	26	37.1	136	62.4	49	37.1
Fruit Juices	48	88.9	64	91.4	209	95.9	124	93.9
Microwavable Meals	5	9.3	15	21.4	25	11.5	28	21.2
Confectionary	35	64.8	41	58.6	78	35.8	74	56.1
Biscuits & Crisps	36	66.7	40	58.6	75	34.4	76	57.6
Bakery Foods	22	40.7	30	42.9	64	29.4	61	46.2
Cereals	7	13.0	15	21.4	25	11.5	37	28.0
Cooked Meals	23	42.6	18	25.7	137	62.8	37	28.0

Table 3.4: Mean portion of fruit, vegetable fast food/prepared foods, fizzy drinks, alcoholic drinks and meals eaten outside the home consumed and results of Kruskal-Wallis analysis of portions of foods consumed by mothers per day per town

Food Type	Mean number of portions				Kruskal-Wallis		
	Barnard Castle	Consett	Tunbridge Wells	Chatham	Chi-Square	df	Sig. (p)
Fruit	2.51	0.24	1.05	0.24	41.613	3	0.000
Vegetable	3.37	1.00	5.76	1.26	55.810	3	0.000
Fast Food/ Prepared Foods	0.31	1.76	0.16	1.50	67.233	3	0.000
Fizzy Drinks	0.14	0.43	0.14	0.52	21.688	3	0.000
Alcohol	0.37	0.52	0.68	0.57	12.809	3	0.005
Meals consumed outside the home	0.10	0.19	0.29	0.29	5.334	3	0.149

Whilst the food recall data show the consequences of store and food type availability, store density clusters can help explain how these environments are used. Areas with a high density of food stores make access to multiple stores easier as they are within close proximity to one another reducing the time and energy required to travel between them. The specific choice of stores within these areas is dependent on a number of personal and economic factors but high density of stores prevents a monopoly of store type within a given area. However, where density is low, or there is a smaller number of available choices there is therefore a compromise between travel distance, convenience and preference. For example, Barnard Castle shows dense area of stores within the town centre, all of which are located within approximately 1.5km of one another (see Figure 3.1). Therefore, to access one particular store in the town is no more difficult, in terms of proximity, than to access another. Whilst close store density to the town centre is also the case in Consett, with a highly dense area, close to the town's High Street, there are also areas of lower density further afar from the immediate centre (see Figure 3.2). Chatham has the highest density of stores of all four study towns (see Table 3.2) and the stores located outside of the High Street and town centres are all fast food restaurants (n =10) or convenience stores (n =12) (see Figure 3.13). By choosing to shop in the areas further afield, Chatham residents have a reduced choice in the types of stores available. On the other hand, in Tunbridge Wells the stores located outside the areas of density are either restaurants (n =8), cafes

(n=1), fast food restaurants (n =4) or super/hypermarkets (n =3) (with the exception of one deli/greengrocers) (see Figures 3.8 to 3.12). Accessibility to highly dense areas provide a greater choice of which stores can be used. However, for individuals not living in the immediate, or with reduced access, to the dense areas, these aspects of the local food environment differ between towns in which stores are available, preferred and used.

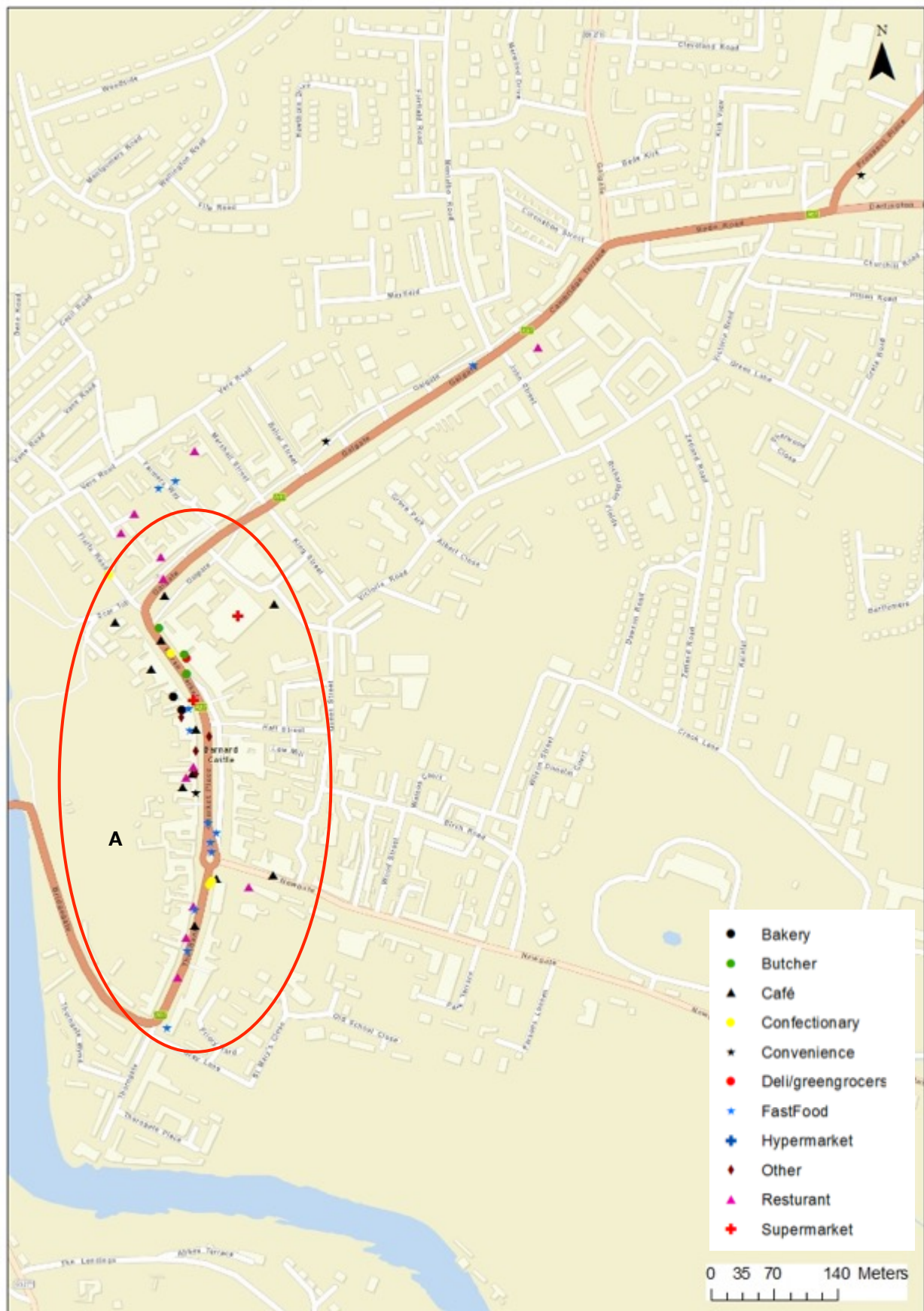


Figure 3.5: Stores in Barnard Castle by type, • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Restaurant, + Supermarket. The area labelled A (outlined in red) is shown at a smaller scale in Figure 3.6. This map shows that all the stores available are within a small geographical area close to the town centre.



Figure 3.6: Stores in Barnard Castle by type – close up area A as referred to in Figure 3.5 • Bakery, • Butcher, ▲ Café, ● Confectionary, □ Convenience, ● Deli/greengrocers, ★ Fast Food, + Hypermarket, ◆ Other, ▲ Restaurant, + Supermarket.

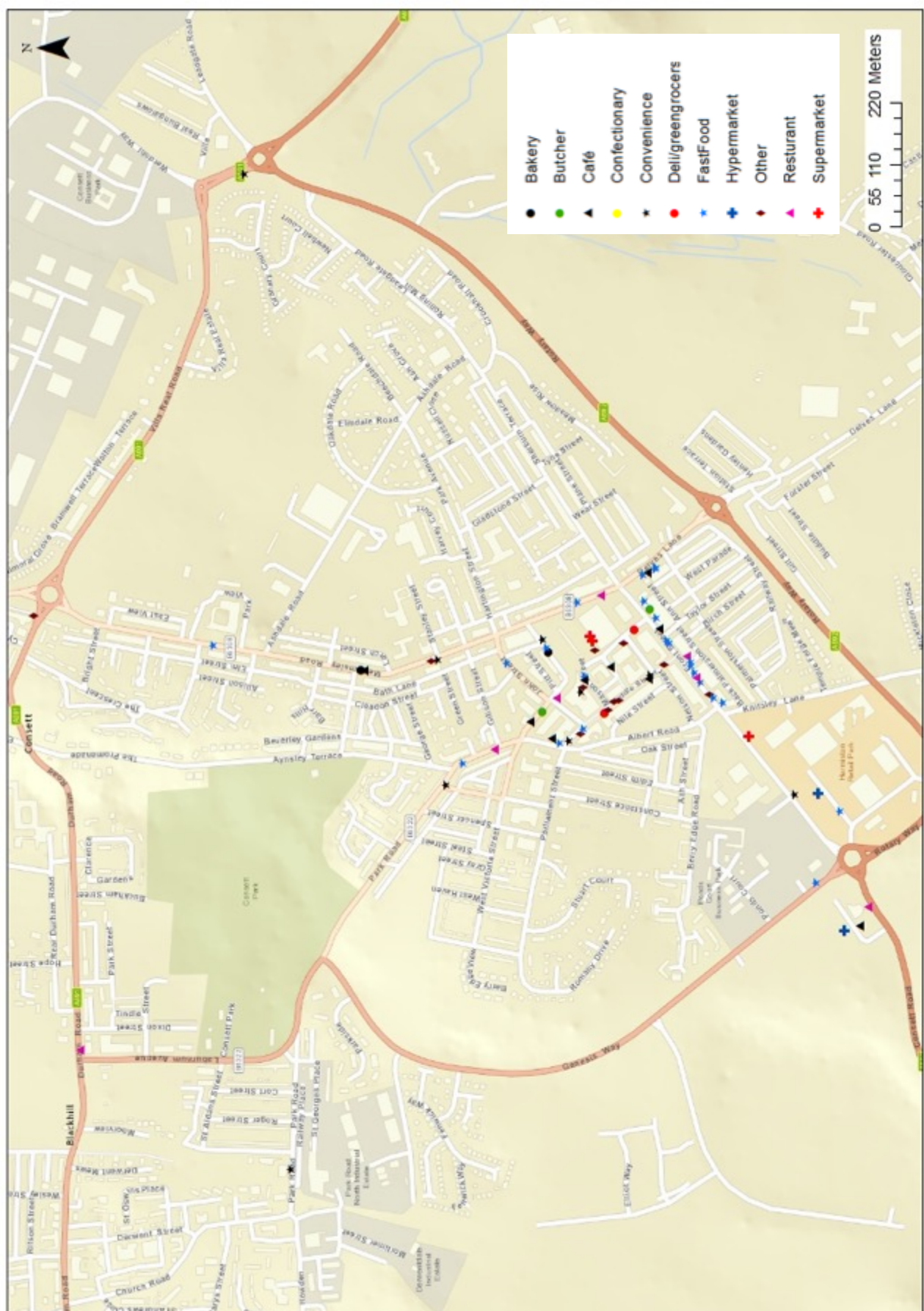


Figure 3.7: Stores in Consett by type • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Restaurant, + Supermarket. Stores are shown to be clustered around the town centre but that other store such as restaurants and convenience stores are found outside the immediate town centre.

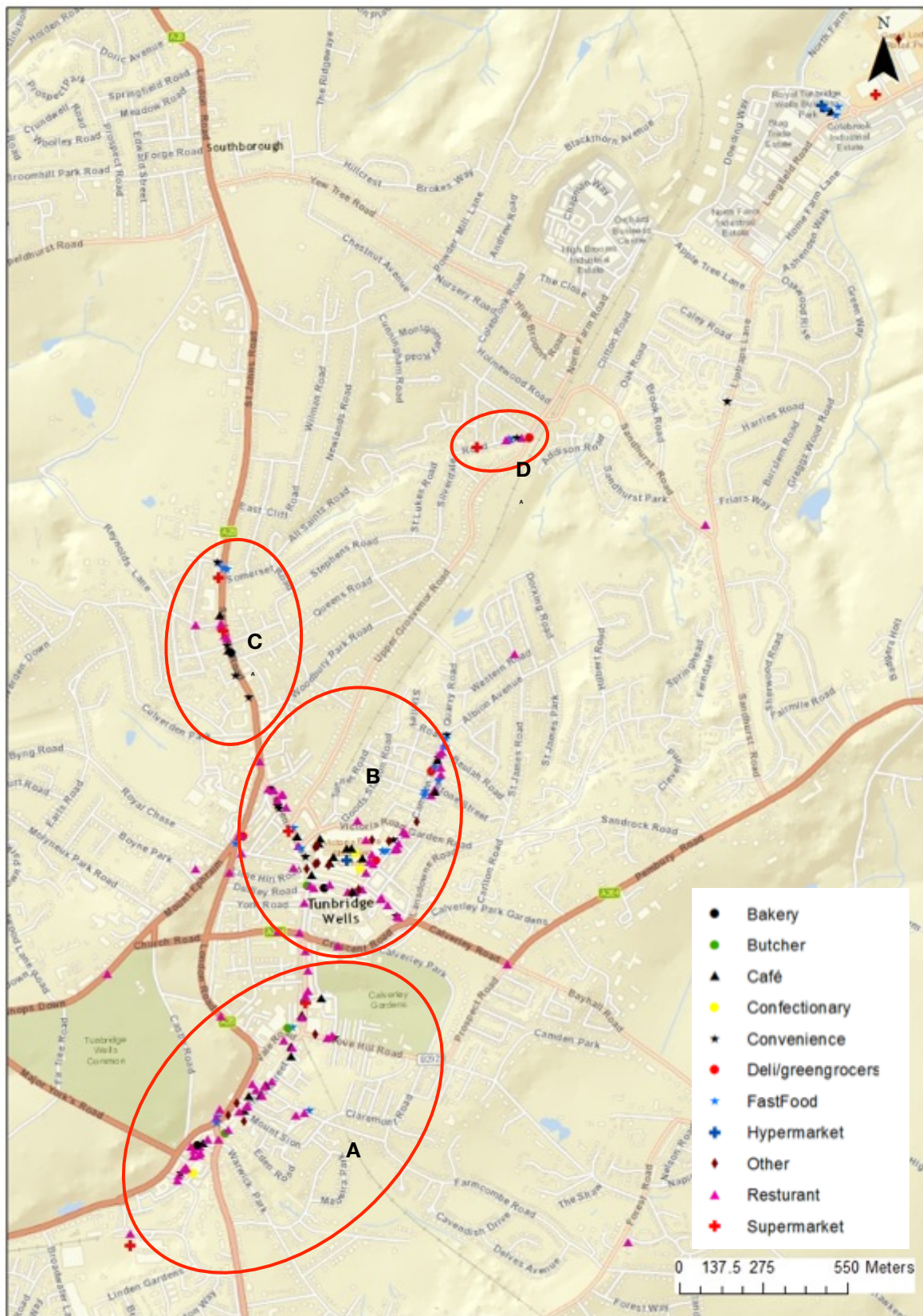


Figure 3.8: Stores in Tunbridge Wells by type, • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Restaurant, + Supermarket. The areas labelled A, B, C and D (outlined in red) is shown at a smaller scale in Figures 3.9, 3.10, 3.11 and 3.12 respectively. This map shows that stores in Tunbridge Wells are spread over the town and result in multiple areas of store density.

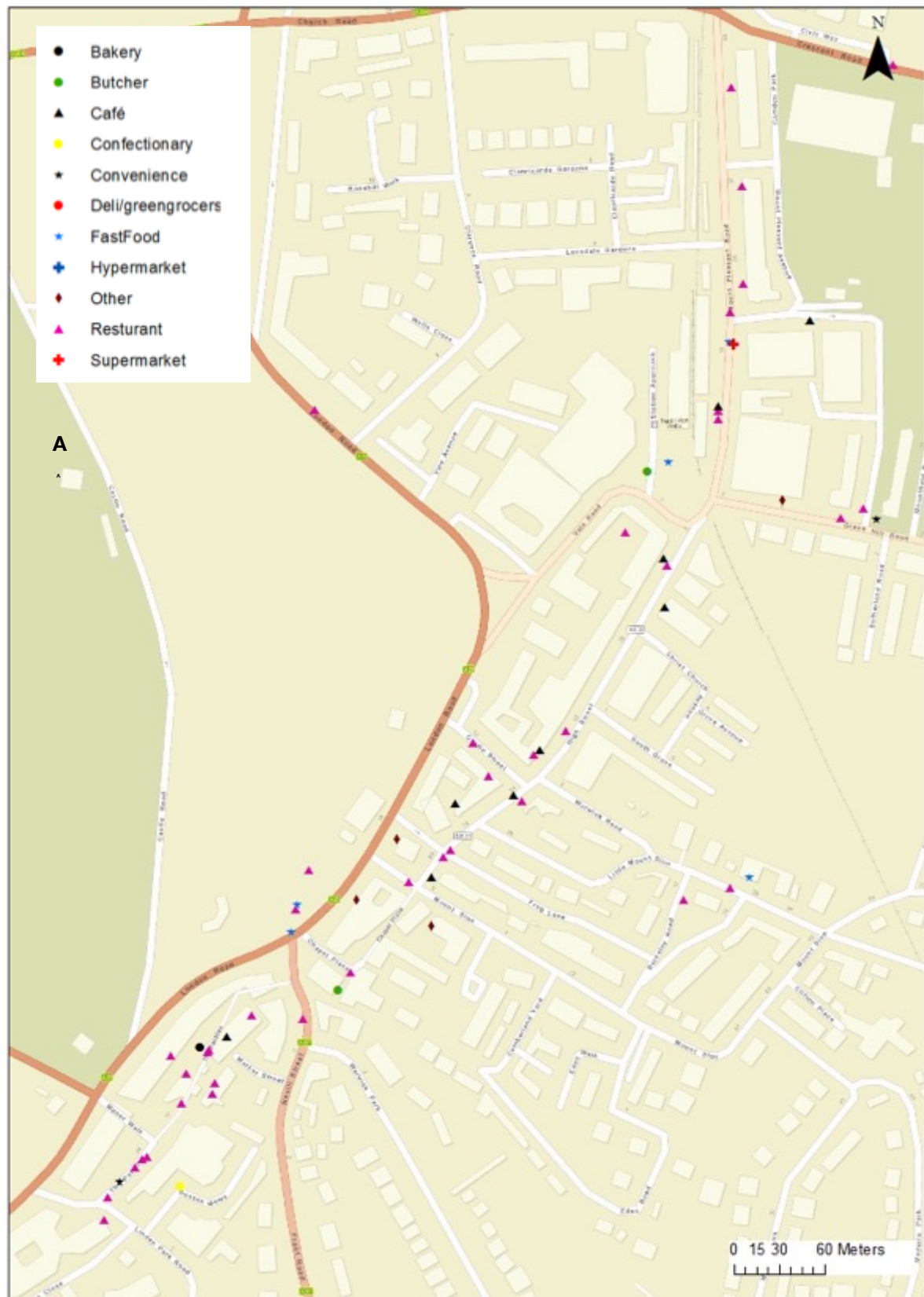


Figure 3.9: Stores in Tunbridge Wells by type – close up area A as referred to in Figure 3.8 • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Resturant, + Supermarket.

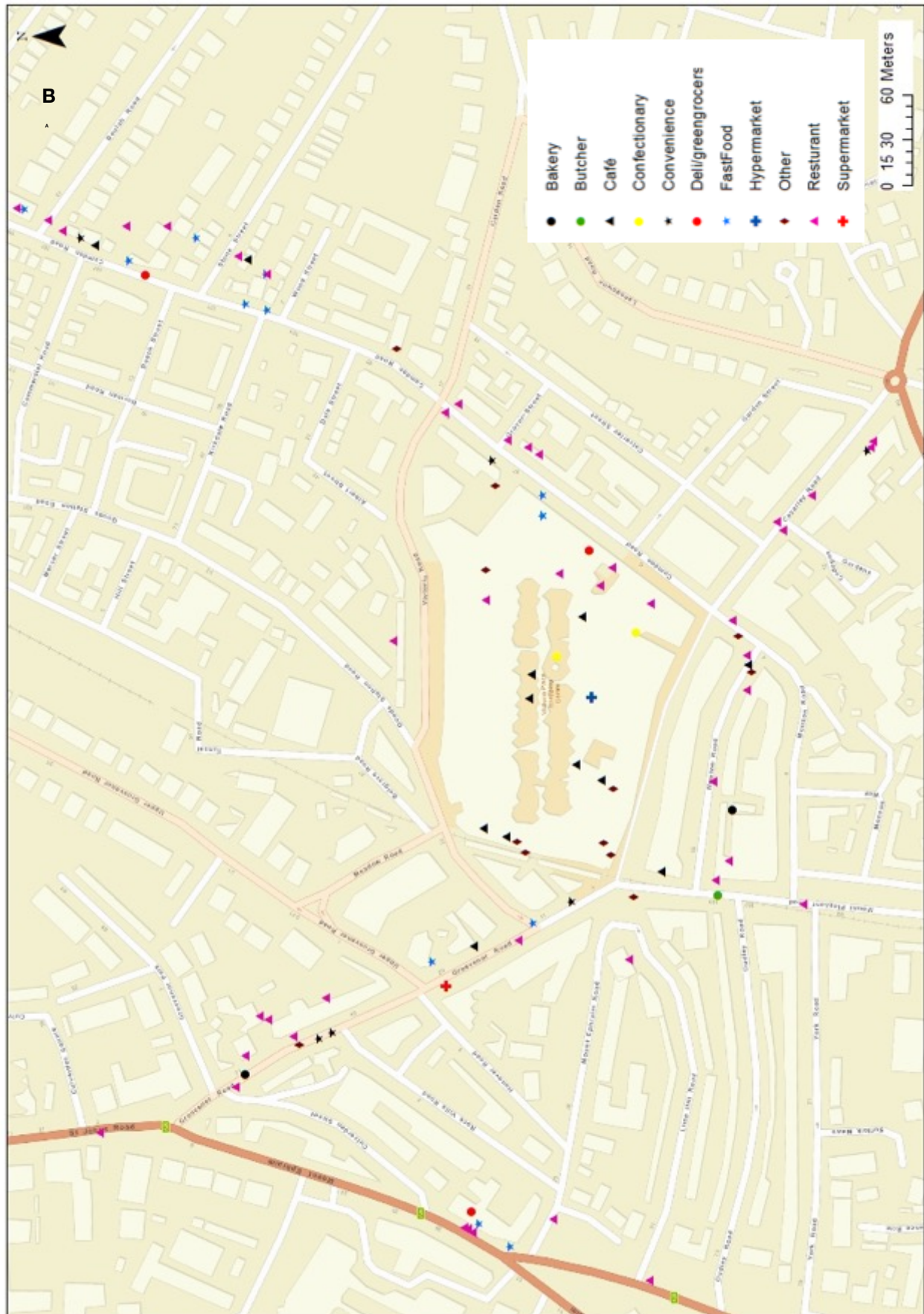


Figure 3.10: Stores in Tunbridge Wells by type – close up area B as referred to in Figure 3.8 • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Restaurant, + Supermarket.



Figure 3.11: Stores in Tunbridge Wells by type – close up area C as referred to in Figure 3.8 • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Restaurant, + Supermarket.



Figure 3.12: Stores in Tunbridge Wells by type – close up area D as referred to in Figure 3.8 • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Restaurant, + Supermarket.

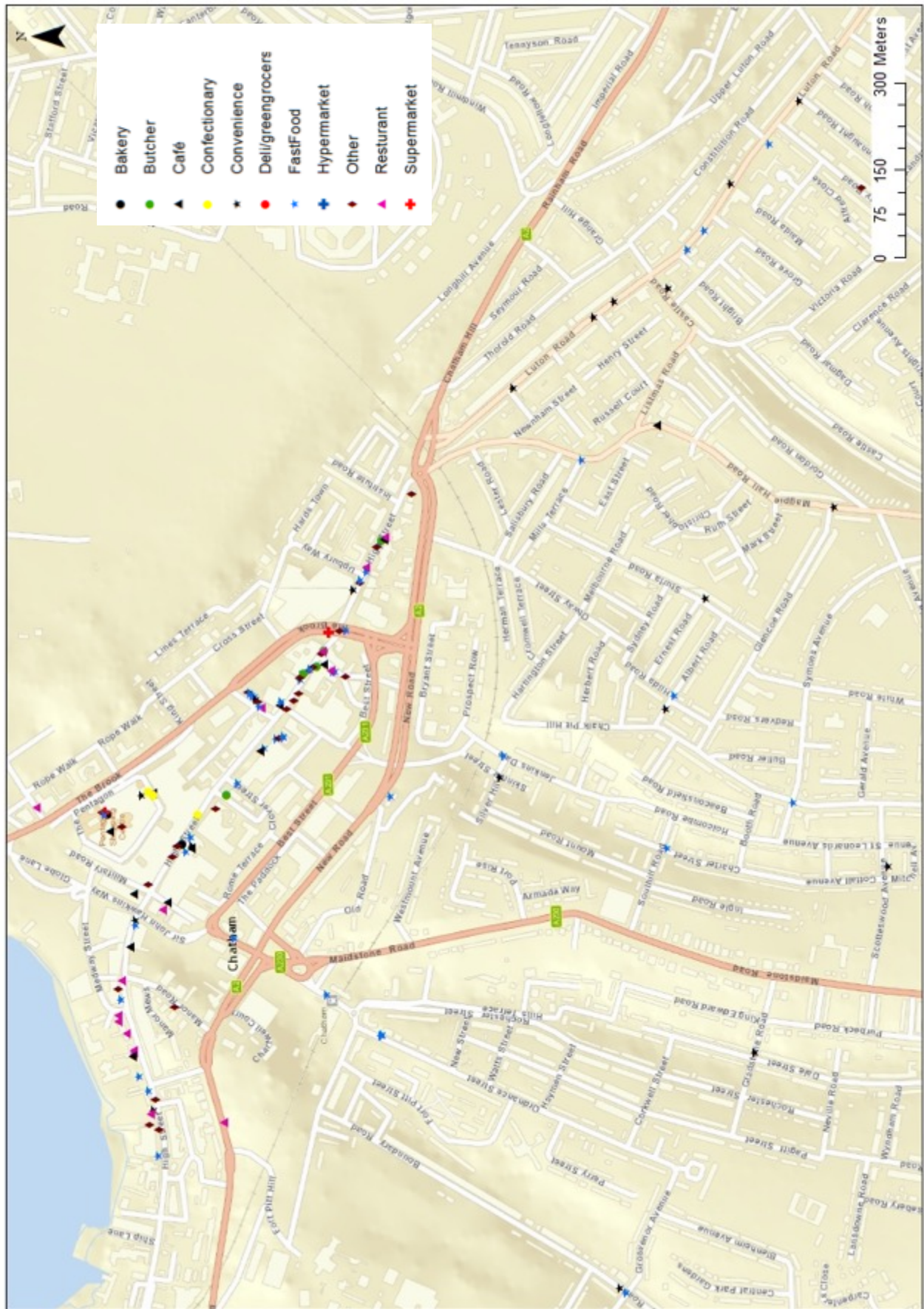


Figure 3.13: Stores in Chatham by type, • Bakery, • Butcher, ▲ Café, • Confectionary, □ Convenience, • Deli/greengrocers, □ Fast Food, + Hypermarket, ♦ Other, ▲ Restaurant, + Supermarket. This map shows that stores are clustered in the town centre but all stores outside the town centre are convenience stores and fast food restaurants.

In all towns supermarkets were identified as the most commonly sought out store in which to procure food. In Barnard Castle and Consett the majority of stores are located in the town centres (see Figures 3.1 and 3.2) and it is the stores in these areas that are the most commonly used by families in each town.

“Nothing in town is too inconvenient, everything’s pretty close together anyway so you can walk anywhere you need to go. Only problem is you don’t do a big shop and then have to walk it home – I’m not fit enough for that! But from here, walking to Iceland or Lidl is just as easy as walking to our closest newsagent so I might as well go there and save the money”

(Consett mother CO102, 2 children)

However, despite supermarkets being identified as the most commonly used store, these two food environments are used differently, with households in Consett tending to actively seek stores within the town, whilst those living in Barnard Castle tend to use stores outside, in neighbouring towns such as Bishop Auckland and Darlington (see Figures 3.14 and 3.15). Using supermarkets as the main store to buy food in Consett and Barnard Castle differs as those available in Consett are, or at least perceived to be, larger and more diverse than those in Barnard Castle and therefore provide a wider range of food types and services. In Consett, the location of schools, extra-curriculum activities as well as the availability of larger, high quality foods in the supermarkets within the town, is one of the main factors that entices participants to procure their food in these stores within the town (see Figure 3.16).

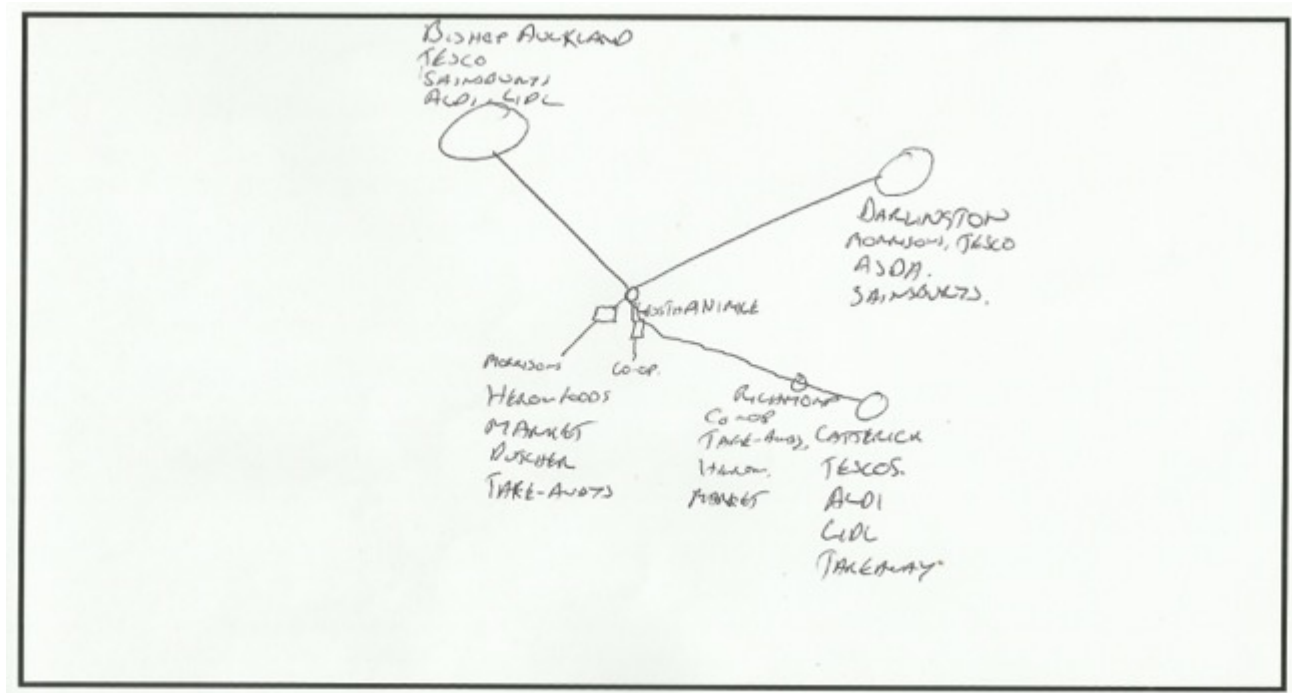


Figure 3.14: Participant map (Barnard Castle mother BC103, 4 children)

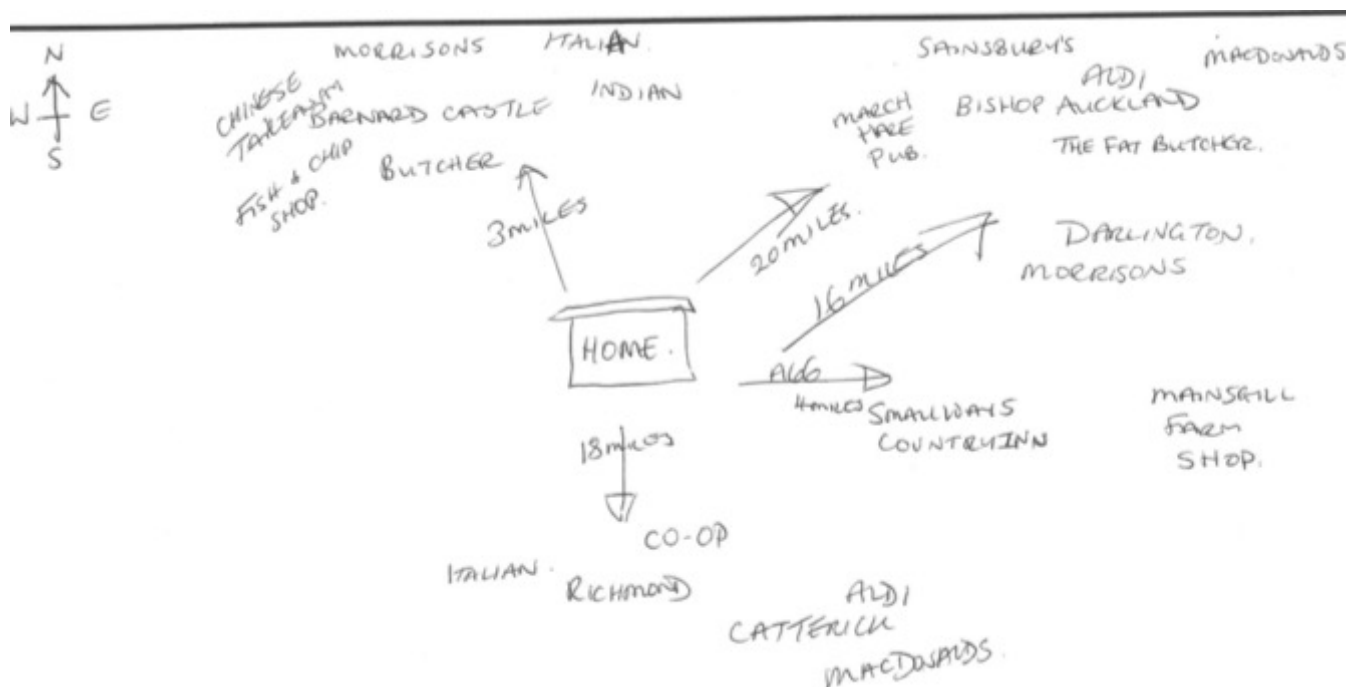


Figure 3.15: Participant map (Barnard Castle mother BC101, 2 children)

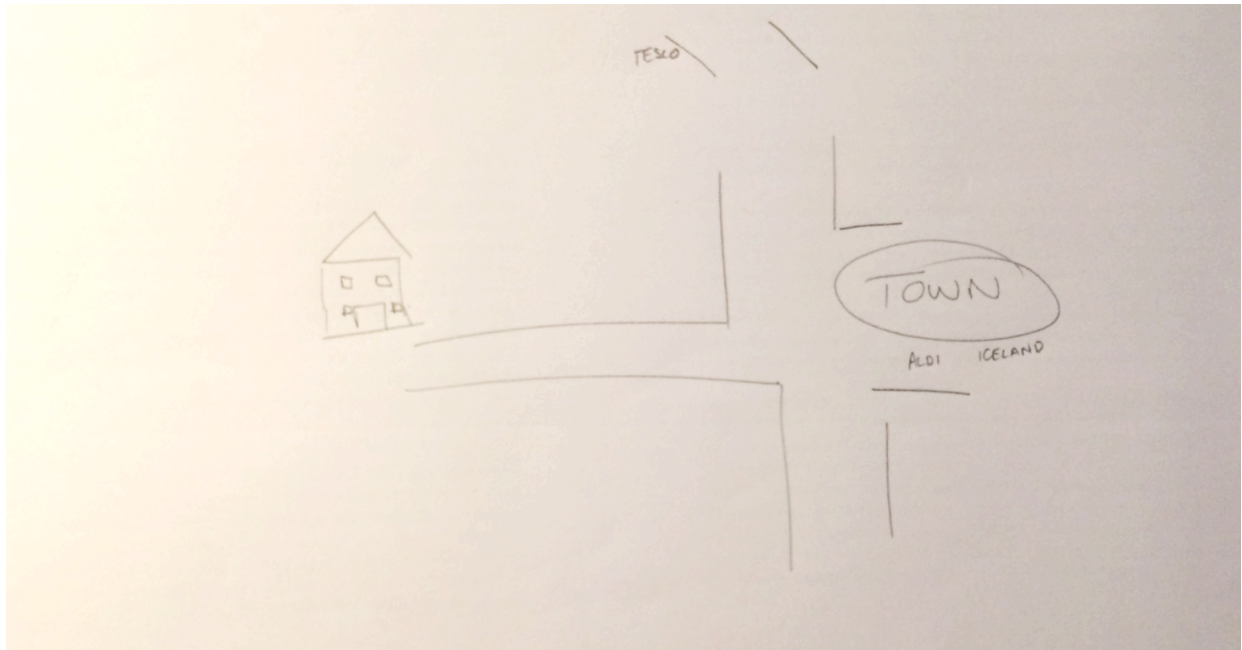


Figure 3.16: Participant map (Consett mother CO102, 2 children)

However, in Barnard Castle households are more likely to shop outside the town. There seem to be several reasons for this, including the quality of the food available. As a result, foods from other stores, which are only available outside the town, are of higher quality. In addition, the fewer options available, within Barnard Castle, drive households to actively seek stores outside the town in neighbouring town to meet their preferences and provide diversity of foods.

"I think the quality of fruit and veg in Morrisons in town is quite poor. I think because it is the main outlet in essence they're not bothered, they've got a monopoly...so I think that is the big difference between the town and the bigger towns."

(Barnard Castle mother BC106, 4 children)

"So when I get fresh fruit and vegetables from Tesco, I think the shelf life of that product is much better, when I get it, it is less bruised. It is more thought about. Whereas in town...no one is really bothered about what the customers is getting."

(Barnard Castle mother BC106, 4 children)

“At West Auckland you’ve got a big Sainsbury’s and a big Tesco”

(Barnard Castle mother BC101, 2 children)

The affordability and store deals are also an important factor in deciding to use stores outside the town centre. Most of these stores provide store loyalty rewards, such as points or vouchers, which are incentive to use particular stores.

“The food at the Co-Op is quite pricey.”

(Barnard Castle mother BC105, 3 children)

“I go where I have the vouchers from.”

(Barnard Castle mother BC101, 2 children)

“I’ve got every store card going.”

(Barnard Castle mother BC102, 3 children)

Therefore, the stores available in Barnard Castle are deemed either too expensive, such as Co-Op, or poor quality, such as Morrison’s. Another important, and perhaps more influential reasoning for using these stores outside the town, is the proximity to children’s extra-curriculum activities and places of work. Despite Barnard Castle providing some activities, parents prefer to travel out of the town to larger towns so that their children can take part in different activities at the same time. Whilst their children are at these clubs, or at work, it provides a convenient time to do the food shopping. All participants in Barnard Castle noted their resistance to taking their children with them on shopping trips due to the additional stress. Therefore, these situations provided a convenient time to shop without their children.

“[Child A] does dance in Bishop [Auckland] on a Tuesday and [Child C] has Brownies, so it would be impossible to get back in time to get [Child D] to football in Barney [Barnard Castle], so he joined the Bishop group.”

(Barnard Castle mother BC106, 4 children)

"I work in Bishop [Auckland] so it's easy to pick bits up at lunchtime or on my way home."

(Barnard Castle mother BC104, 4 children)

"We go to Aldi in Bishop Auckland because we take [Child C] swimming on a Friday."

(Barnard Castle mother BC102, 3 children)

In Tunbridge Wells there is more than one geographically dense area of food stores (see Figure 3.3) and as a result despite where participants live they are able to easily walk and access food stores in a given location (see Figure 3.17). As Figures 3.8 to 3.12 show, stores found outside the immediate town centre are mainly restaurants ($n=8$), although cafes ($n=1$), hyper and supermarkets ($n=3$), fast food ($n=4$) and convenience ($n=2$) stores are also present. Therefore, for some of the stores in close proximity to residence are used for convenience on a day-to-day basis.

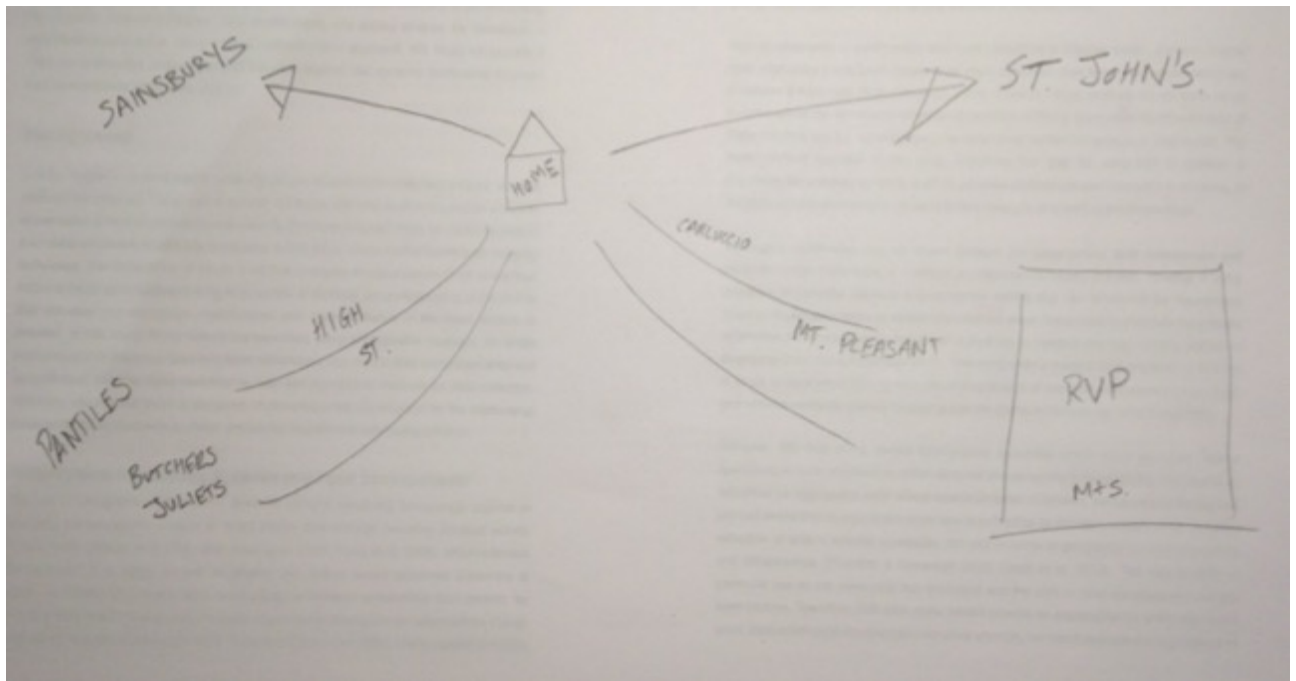


Figure 3.17: Participant map (Tunbridge Wells mother TW101, 2 children)

“I like to use the stores that I can walk to, so the ones in the town centre mainly”

(Tunbridge Wells mother TW102, 2 children)

“Walking to town isn’t that easy for us but there are the shops just up the road we use, especially the pub ‘cos it’s so close and really tasty. It also means we can drink and walk home and not have to get a taxi”

(Tunbridge Wells father TW109, 3 children)

Nevertheless, the town centre is still a focal point for food procurement in Tunbridge Wells. Some participants attributed using the town centre to having a wide range of store types, in addition to speciality shops such as butchers and bakeries (see Figures 3.8 to 3.12) that participants prefer and therefore use more so than supermarkets which provide all food types (see Figure 3.17).

“Tunbridge Wells has pretty much everything you need. We are very lucky.”

(Tunbridge Wells mother TW101, 2 children)

“We get all our meat from Speight’s on Chapel Place and we use the Health Food Shop on the High Street for much of our dry goods”

(Tunbridge Wells mother TW103, 3 children)

In addition, for participants in Tunbridge Wells food procurement is also associated with being a social activity. Therefore, shopping, including food procurement is more enjoyable and convenient when it also incorporates or allows for a social situation. The local food environment of Tunbridge Wells allows for this due to the geographical set up of particular food stores such as supermarkets and butchers in conjunction with more socially apt stores such as restaurants and cafes within close proximity and accessibility of each other.

“We use Tunbridge Wells Farmer’s Market and the Pantiles Markets. We like to chat with the producers.”

(Tunbridge Wells mother TW107, 3 children)

"I love the shopping centre in the town [Tunbridge Wells]. I often meet my mum there for coffee, so I can catch up with her, run a few errands, pick up something for dinner and do a spot of shopping all at the same time."

(Tunbridge Wells mother TW101, 2 children)

On the other hand, in Chatham most housing areas are outside the town centre, requiring approximately a 15-minute walk into the centre and as a result stores closest to participant's home are particularly popular (see Figures 3.2 and 3.18). As Figure 3.13 shows, these stores are predominately fast food restaurants and convenience stores.

"For me, the shop on the corner, literally just at the end of the road, is really convenient. I can walk there and not have to take the kids, and I don't mind leaving them at home as I'm only gone a couple of minutes or I send one of the kids over 'cos it's not too far"

(Chatham mother CH104, 4 children)

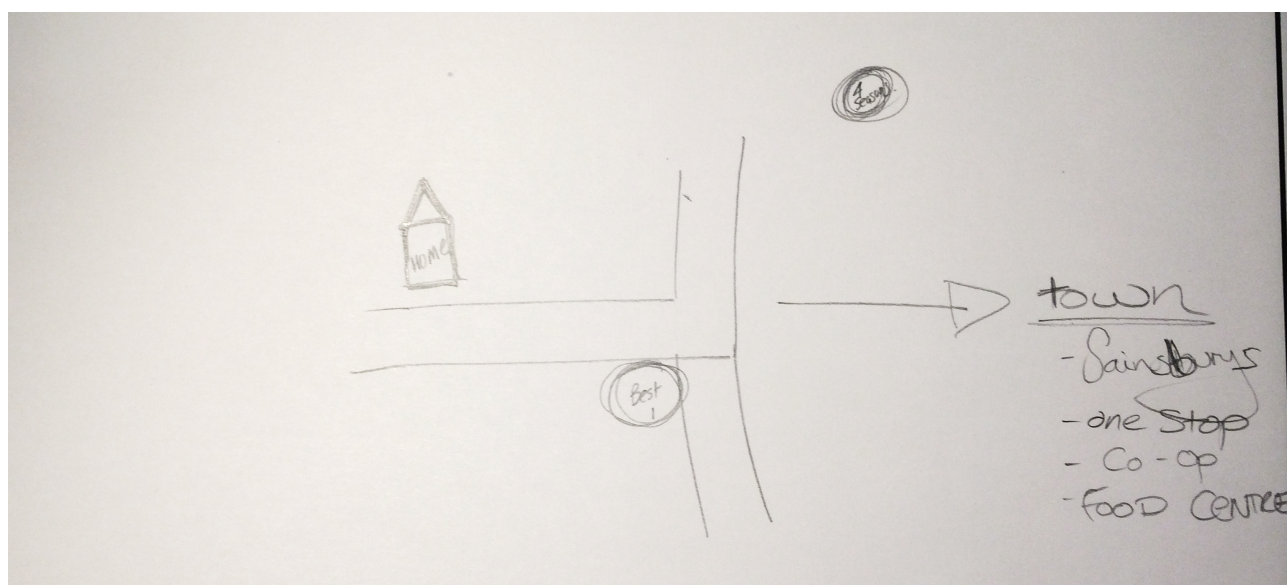


Figure 3.18: Participant map (Chatham mother CH104, 4 children)

Access to stores further away, such as those in the High Street, require more time, organisation and are more difficult to access. Some participants living in Chatham noted their dislike of food shopping and food orientated activities, and perceived it as a chore. For these parents, they would prefer their time be spent on other activities. Therefore, for parents living in Chatham proximity and convenience of stores are highly influential in

deciding which are used and the foods purchased. Convenience store use is especially significant where time can be saved in order to spend time on other activities.

“I hate shopping – it’s such a bore! I normally pick a few bits up on my way home when I’m already in town. I don’t like going into town just for food – it’s just a long way down there and takes so much time”

(Chatham mother CH105, 3 children)

The local food environments of the four study sites have shown significant differences in density (see Figures 3.1 to 3.4) and composition in terms of the stores (see Table 3.2) and food types available (see Table 3.3). In turn, food recall analysis has shown how these differences in the local food environment play a role in complexity of determining food choices. Participant observation and participatory mapping, in addition to GIS and food recall data have allowed a further understanding of the complexity of food choices in terms of procurement and consumption by highlighting the importance of store location as well as proximity.

3.1 Car Ownership

Car ownership has previously been shown to have an effect on dietary patterns and how the local food environment is used (Inagami *et al.*, 2009). Access to a car provides more choice in terms of which stores can be used as the accessible geographical area widens. Otherwise, residents are restricted to the stores that are geographically close and easily accessible. Only food that can be carried can be bought and therefore, households struggle to buy in bulk (Cummins and Macintyre, 1999; Inagami *et al.*, 2009). The numbers of cars owned and available to use per household does differ between towns (see Table 3.5). However, car ownership is influenced by household income and therefore access to a car is strongly influenced by socio-economic status.

Table 3.5: Car ownership in each household, by town

Ratio of cars to number of adults per household	Barnard Castle (n)	Consett (n)	Tunbridge Wells (n)	Chatham (n)
0 cars	0	0	0	2
1 car: 2 adults	1	1	1	2
1 car: 1 adult	6	2	5	2
3 cars: 2 adults	0	0	3	0

In Chatham 33% of the study households do not have access to a car, and 50% of households have one car that was to be shared with all adults within the household. The lack of car ownership and dislike of using public transport amongst the sample in Chatham was a key reason for the use of convenience stores for the participants in my study.

“You can’t get too much ‘cos you’ve got to carry it back.”

(Chatham mother CH103, 2 children)

“It’s a nightmare getting the bus. They only come once every half hour and most of the time they’re late. They stink and it costs £2.20 just to get into town.”

(Chatham mother CH103, 2 children)

“[Child B] will go to the shop over the road and buy a Coke and a sweet or something.”

(Chatham mother CH102, 3 children)

The differences in dietary intake by car ownership show that lack of access to a car decreases intake of fruit and vegetables but increases the consumption of fast food and fizzy drinks (see Table 3.6) (Kruskal Wallis test; Fruit $X^2(3) = 13.267$, $p < 0.05$; Vegetables $X^2(3) = 16.586$, $p < 0.001$; Fast Food / Prepared Foods $X^2(3) = 13.738$, $p < 0.05$; Fizzy Drinks $X^2(3) = 10.940$, $p < 0.05$). A qualitative assessment of the data suggests that the positive relationship between car to adult ratio and fruit and vegetable intake is exaggerated in children and less so in adults. However, intake of fast food seems to be consistently high amongst households with lack of access to a car. The lack of access to a car ensures individuals are restricted to stores available with walking distance in their local food environment. Where the local food environment has a large number of fast food stores,

these stores provide a convenient and easy means of providing a meal on the way home from school.

“It’s so much easier to grab some food on the way home from school than have to cook when you get in...I mean it’s not much more pricey either. A [McDonalds] Happy Meal is only £2. You can’t make something for much less than that.”

(Chatham mother CH105, 3 children)

Furthermore, statistical analysis shows that alcohol consumption is significantly related to car ownership such that as the ratio of cars to adults per household increases, so does the consumption of alcohol (Alcohol $X^2(3) = 10.307$, $p < 0.050$). However, meals consumed outside the home is not significant between households with differing ratios of car ownership, as consumption of food outside the home is most likely to be driven by household income and personal preference.

Table 3.6: Mean portion of fruit, vegetable fast food/prepared foods, fizzy drinks, alcoholic drinks and meals eaten outside the home and results of Kruskal-Wallis analysis of portions of foods consumed by mothers per day by ratio of car ownership to number of adults per household

Food Type	Ratio of cars to adults per household				Kruskal-Wallis		
	0:0	1:2	1:1	3:2	Chi-Square	df	Sig. (p)
<i>n</i>	2	5	15	3			
Fruit	0.50	1.49	1.02	1.81	13.267	3	0.004
Vegetable	1.36	2.49	3.80	4.62	16.586	3	0.001
Fast Food/ Prepared Foods	1.64	0.91	0.60	0.33	13.738	3	0.003
Fizzy Drinks	0.50	0.43	0.21	0.14	10.940	3	0.012
Alcohol	0.00	0.51	0.61	0.67	10.307	3	0.016
Meals consumed outside the home	0.29	0.20	0.25	0.10	2.248	3	0.523

Car ownership, however, has previously been shown to be related and dependent on socio-economic status, in particular household income. However, the sample size of my data is not large enough for multi-variant analysis to account for these confounding variables. Instead I have split the data by household income bands to re-run the analysis (see Table 3.7). Using the median household income band (£35-70k) I split the analyses by household incomes of 'Under £35k', '£35-70k' and 'Over £70k'. This stratified analysis also shows there to be significant differences in consumption of fruit by car ownership across household with an income of £70k or above (Kruskal-Wallis test $X^2(1) = 7.649$, $p < 0.05$). However, by splitting the data, analysis shows this is the only significant relationship between car ownership and consumption of fruit, vegetables, fast food, fizzy drinks and alcohol as well as meals consumed outside the home (see Table 3.7).. By splitting the data it is possible to show the minimal statistical effect of household income on car ownership and therefore the differences found between the nutritional consumption are most likely driven by car ownership and accessibility to stores.

Table 3.7: Mean portion of fruit, vegetable fast food/prepared foods, fizzy drinks, alcoholic drinks and meals eaten outside the home and results of Kruskal-Wallis analysis of portions of foods consumed by mothers per day by car ownership split by household income band

Food Type	No. cars owned				Kruskal-Wallis		
	0:0	1:2	1:1	3:2	Chi-Square	df	Sig. (p)
<i>n</i>	2	5	15	3			
Under £35k	2	1	3	-			
£35-70k	-	4	9	-			
Over £70k	-	-	3	3			
Fruit							
Under £35k	0.50	0.00	0.67	-	2.874	2	0.238
£35-70k	-	1.86	1.21	-	0.507	1	0.476
Over £70k	-	-	0.81	1.81	7.649	1	0.006
Vegetables							
Under £35k	1.36	0.14	2.71	-	5.927	2	0.052
£35-70k	-	3.07	3.05	-	0.747	1	0.387
Over £70k	-	-	7.14	4.62	3.401	1	0.065
Fast Food/ Prepared Foods							
Under £35k	1.64	1.86	1.33	-	4.280	2	0.118
£35-70k	-	0.68	0.52	-	0.549	1	0.459
Over £70k	-	-	0.10	0.33	2.516	1	0.113
Fizzy Drinks							
Under £35k	0.50	1.00	0.33	-	8.683	2	0.013
£35-70k	-	0.29	0.19	-	1.323	1	0.250
Over £70k	-	-	0.14	0.14	0.000	1	1.000
Alcohol							
Under £35k	0.00	0.29	0.29	-	3.646	2	0.162
£35-70k	-	0.57	0.62	-	0.001	1	0.974
Over £70k	-	-	0.90	0.67	0.522	1	0.470
Meals consumed outside the home							
Under £35k	0.29	0.29	0.24	-	0.120	2	0.942
£35-70k	-	0.18	0.22	-	0.039	1	0.844
Over £70k	-	-	0.33	0.10	2.516	1	0.113

Car ownership allows other stores to be accessed in order to source high quality fruit and vegetables. As Table 3.3 shows, only 12.1% of stores in Chatham stock fresh fruit and 15.2% of stores stock fresh vegetables which requires access to other areas in order to source these foods. This may also explain why fruit and vegetable consumption is low in Chatham where there is also low car ownership. On the other hand, fast food and prepared foods as well as fizzy drink consumption decreases, as access to cars is more available (see Table 3.6). Households with access to cars are not necessarily restricted to stores within walking distance.

The local food environments in these four study sites show that the geographical positioning of food stores can influence the food purchasing and procurement habits of residents (Morland, Wing and Diez Roux, 2002; Thornton and Kavanagh, 2010; Caspi *et al.*, 2012). Singular dense areas within a small geographical area, as in Barnard Castle and Consett, with densities of 5.9 and 10.0 stores/km² respectively, restrict the number of geographical areas available within the town to shop. Therefore, residents can either chose to visit these specific places, where all available stores are then closely located and therefore more convenient to use, as in Consett. On the other hand, they can actively choose to use neighbouring food environments, as in Barnard Castle. This may be convenient with other aspects of their lifestyle, such as work or schooling, or perhaps preference for particular stores or store type (Bove, Sobal and Rauschenbach, 2003; Carrigan, Szmigin and Leek, 2006; Buckley, Cowan and McCarthy, 2007; Gallo, Barrett and Lake, 2014). However, in towns where there are more than one dense area of food stores, as in Tunbridge Wells, or where stores are more dispersed, as in Chatham, the greater number of choices available to these residents allows for a more active choice as to which locations and stores are used (Cummins and Macintyre, 1999, 2006a). Nevertheless, geographies are not the only influential factors that determine food choice and food related behaviours. Other lifestyle and socio-economic status factors also influence how the local food environment is used (Bourdieu, 1984; Miller, 1998, 2001; Miller *et al.*, 1998; Costa *et al.*, 2013).

HOW DO ASPECTS OF SOCIO-ECONOMIC STATUS INFLUENCE FAMILY FOOD CHOICES AND FOOD-RELATED BEHAVIOURS?

Food choice and food related behaviours have been shown to be dependent on an individual's socio-economic status (SES) whereby higher levels of SES are correlated to higher quality diets, (Darmon & Drewnowski 2008; Khush 2001; Yajnik et al. 2003; Jetter & Cassady 2006; Cade et al. 1999; Griffith, Lluberas, et al. 2013). High quality diets are considered to be those that are low in fat, sugar and saturated fats but high in fruit and vegetable consumption (Liese et al. 2007; Kirby et al. 1995; McDermott & Stephens 2010; Aggarwal et al. 2011). The SES of an individual, or household, plays a part in determining the level of disposable income available, the accessibility and affordability of given commodities and services such as schooling and extra-curricular activities which all impact on food choices and related behaviours. In my study, household SES is measured by household income and the highest level of education of an adult in each household. This chapter is focused on how these measures of SES (household income and level of education) influence food choices and food related behaviours in terms of food procurement and consumption.

4.1 Household Income

The contrasts in the local food environments between the towns have been discussed in the previous chapter and the differences may, in part, be a result of the varying levels of household income (Griffith, O’Connell, et al. 2013; McDermott & Stephens 2010).

Household income (see Table 4.1) significantly differs between families in the four towns (Kruskal-Wallis test $X^2(3) = 1688.100$, $p < 0.001$). Tukey post-hoc analysis shows that significance in household income is present between all towns, except between Barnard Castle and Consett where there is no significant difference. General trends show that the highest levels of income are in Tunbridge Wells and the lowest in Chatham (see Table 4.1). Varying levels of household income between the study towns can explain the differences in the local food environments, how they are used and the subsequent dietary choices.

Table 4.1: Household income of study sample per town

Town	Number of households (n)			TOTAL
	Under £35k	£35k-£70k	Over £70k	
Barnard Castle	1	6	0	7
Consett	1	2	0	3
Tunbridge Wells	0	3	6	9
Chatham	4	2	0	6
TOTAL	6	13	6	25

In the towns with higher household incomes, especially Tunbridge Wells, cost and budgeting is not often a determining factor in food and store choice. On the other hand, in other towns, such as Consett, cost is much more important as to which stores are used.

“I go to the butchers on Chapel Place because the meat is of good quality and use Able and Cole boxes for our vegetables. They are more expensive but we know that it’s been selected in a way that aligns with our own family ethics. It’s seasonal, only travelled a few miles, supports British farmers etc.”

(Tunbridge Wells mother TW102, 1 child)

“I tend to use Asda or Aldi because it’s much cheaper than other supermarkets”

(Consett mother CO102, 3 children)

Higher overall income can increase the level of disposable income available within the household for other commodities (Griffith, Lluberas, et al. 2013; Griffith & Nesheim 2008). Whilst commodities may incorporate a variety of different products and activities, such as extra-curricular activities, holidays or technology higher income also allows for improved dietary quality and variety. In turn, varying levels of household income and the subsequent differences in the use of the local food environment also implicate the food choices made. Household income here has a significant relationship with the number of fruit, vegetable, fast/prepared foods, fizzy drinks and alcohol portions consumed (see Table 4.2). Fruit and vegetable intake both show a positive correlation to household income, such that as household income increases so does the number of portions consumed (Fruit; Kruskal-Wallis $X^2(2) = 8.641$, $p < 0.05$; Vegetables; Kruskal-Wallis $X^2(2) = 28.736$, $p < 0.000$). Tukey post-hoc analysis also shows significance between fruit and vegetable intake with a greater intake in higher income groups. Participant observation shows that households with lower levels of household income stated that the lack, or reduced, consumption of fruit and vegetable is in part attributed to price.

“Fruit and veg is so expensive! Especially fruit. I can’t justify buying a thing of strawberries for £2-£3. I could buy so much more for that, that will fill them up and not go in 30 seconds...so it’s a waste of money to buy them.”

(Chatham mother CH105, 3 children)

On the other hand, as household income increases, the mean quantity of portions of fast food and prepared foods consumed decreases (Kruskal-Wallis $X^2(2) = 32.482$, $p < 0.000$) (see Tables 4.2). Post-hoc analysis also shows that the differences are most significant between the households of higher income. Participants often attributed this to perceiving fast food or prepared foods within their diet as saving money and time (Buckley et al. 2007; Carrigan et al. 2006).

Food recall analysis shows a reduction in the number of portions of fizzy drinks consumed as household income increases (Kruskal-Wallis $X^2(2) = 14.149$, $p < 0.01$). The increased consumption of fizzy drinks and alcohol may be due to affordability or other factors such as the geography of the local food environment, nutritional education and the social aspect of food orientated activities (Glovannucci et al. 1991; Thornton & Kavanagh 2010; Block & Kouba 2006a; Drewnowski & Darmon 2005). Consumption of alcoholic drinks shows a significant difference between household income levels and consumption (Kruskal-Wallis

$X^2(2) = 17.719$, $p < 0.000$). There is a greater level of consumption of alcohol in households of a greater income. Nevertheless, despite the statistical relationship, the qualitative assessment of households suggests that increase in alcohol consumption amongst higher income households is not necessarily driven by the greater income but instead with socialising and personal preferences. During observations with households, adults in Tunbridge Wells tended to drink alcohol with each evening meal due to preference whilst in other households alcohol consumption is more so for weekends and at particular social events. Therefore, the preference to drink alcohol during the week is not necessarily driven by income but instead preference. As households in Tunbridge Wells have the highest income (in this study), this is likely to be the reason for driving the statistical correlation.

Table 4.2: Mean portion of fruit, vegetable fast food/prepared foods, fizzy drinks, alcoholic drinks and meals eaten outside the home and results of Kruskal-Wallis analysis of portions of foods consumed by mothers per day by ratio of car ownership to number of adults per household

Food Type	Household Income			Kruskal-Wallis		
	Under £35k	£35k-£70k	Over £70k	Chi-Square	df	Sig. (p)
<i>n</i>	6	13	6			
Fruit	0.50	1.41	1.31	8.641	2	0.013
Vegetable	1.83	3.05	5.88	28.736	2	0.000
Fast Food/ Prepared Foods	1.52	0.57	0.21	32.482	2	0.000
Fizzy Drinks	0.50	0.22	0.14	14.149	2	0.001
Alcohol	0.19	0.60	0.79	17.719	2	0.000
Meals consumed outside the home	0.26	0.21	0.21	0.898	2	0.638

The highest levels of food eaten outside the home are found at the lowest household income levels. Whilst no significant differences are found in the consumption of meals outside the home, participatory data can explain the trends of food consumed outside the home across the different income levels. Some households use food outside the home frequently in an attempt to save money and time, similar to fast food/prepared food consumption. However, for other households, consumption is much lower due to the cost of eating outside the home. Whilst for others, food consumed outside the home is used

specifically for social reasons and for special occasions. In families of higher household income, adults ate out more (compared to those of lower income) in order to maintain social relationships and networks and therefore this could also be associated with the significant increased consumption in adults.

“I’d love to eat out more but it’s quite pricey.”

(Consett mother CO101, 3 children)

“I would say we go to a restaurant at least once a week – normally on a Friday evening with friends or the kids. We also go if it’s someone’s birthday, anniversary, the kids have done well at school. We like to try new restaurants and we’re spoilt for choice here [Tunbridge Wells].”

(Tunbridge Wells mother TW105, 4 children)

A major qualitative theme that emerged from the participatory data is affordability. In every town, price and relative price (e.g. value for money) were identified as important factors. How affordability was defined and understood differed between towns and between household income levels. This included what is considered as value for money, for example, keeping to a budget. How this is distinguished between levels of household income, was a prominent theme in determining food choices. There is also often a compromise between cost and quality, such that value for money was a particular important factor.

“My friend introduced me to a butchers in Bishop Auckland, which I am going to have a look at because that seems rather cheap. 20 chicken breast for £20. So I’m going to have a look at that because for me that could be quite economical.”

(Barnard Castle mother BC103, 4 children)

“At the end of the day the budget over rules whether I’m trying to be healthy or not”

(Barnard Castle mother BC101, 3 children)

“Value for money is probably the most important things that influences where I buy my food”

(Consett mother CO101, 2 children)

“I wouldn’t say I’m tight, I’m not tight with my money but I do want value for my money because then it makes way to have a better kitchen or you know.”

(Consett mother CO102, 2 children)

However, in some households, price is considered an influential factor but not necessarily the most important in determining which stores are used and the foods purchased. For some, food is also generally not perceived to be expensive.

“I wouldn’t say money is the main thing. Probably what the kids are going to eat and what I like. Food isn’t that expensive. Although I would say most of our money probably goes on food and stuff.”

(Chatham mother CO102, 2 children)

Therefore, despite being the most financially constrained, some households in Chatham do not perceive food to be a major part of the financial outgoings. On the other, households of the highest incomes, particularly those in Tunbridge Wells, placed less importance on price but instead other factors play prominent roles in food and consumer choices.

“Researcher: What would you say is the biggest influence as to where you buy your food?

Participant: Distance. Pleasantness of the shopping experience and the quality of the produce. Also the ethics – I prefer British grown produce and humanly reared meat and organic foods because of the reduced impact to the environment.”

(Tunbridge Wells mother TW101, 2 children)

Despite the restrictions of a budget, many households, of both lower and middle-income ranges, desire to purchase higher quality and a wider variety of foods is noted. Both parents and children are aware of the health benefits of ‘healthy’ diets and would like to include ‘healthier’ foods in their diets. This, however, is restricted by the relative and perceived affordability of higher quality and a greater diversity of foods.

“I would love to be able to afford organic products, yes. But I can’t. They are just too expensive.”

(Barnard Castle mother BC104, 4 children)

“I would definitely rather have a moral conscious about it and buy it if it was grown, you know in Newcastle rather than Namibia but at the end of the day you’re on a budget and especially when we’ve got like three kids so I am sort of conscious of it”

(Barnard Castle mother BC101, 3 children)

Therefore, despite evident differences between household income and specific nutrients, as well as having an important role in determining food choice within each town, there are other important aspects of household dynamics and structure that determine food and dietary choices in many households in all four towns.

4.2 Highest Level of Education

In my study I have measured the parental highest level of education in each household. Parental education has been shown to significantly influence nutritional intake by providing an understanding of high quality diets and the health benefits of such diets (Burt and Hertzler, 1978; Borah-Giddens and Falciglia, 1993; Wardle, Parmenter and Waller, 2000; Rydén and Hagfors, 2011).

Education is also related to socio-economic status and as such the measured factors in my study which are household income, education levels and care ownership are all related. There are significant differences between the study towns and highest level of qualification (see Table 4.3) such that the highest qualification levels were found in residents living in Tunbridge Wells and the lowest in Chatham (Kruskal-Wallis test $X^2(3) = 1400.559$, $p < 0.000$). Those living in Barnard Castle had a substantial greater mean education levels than Consett. Post-hoc analysis shows that the differences in highest level of education across the towns are significantly between all towns.

Table 4.3: Study sample households by highest level of by highest level of qualification (see Table 2.3) per town

Educational Level	Barnard Castle		Consett		Tunbridge Wells		Chatham	
	No. of households (n)	%	No. of households (n)	%	No. of households (n)	%	No. of households (n)	%
None – 2	0	0.0	0	0.0	0	0.0	4	66.7
3-5	3	42.9	2	66.7	1	11.1	2	33.3
6-8	4	57.1	1	33.3	8	88.9	0	0.0

There are also statistical differences by educational levels in consumption of fruit and vegetable portions, use of fast food/prepared foods as well as consumption of fizzy drinks (see Table 4.4). As household education increases, the number of fruit and vegetable portions per meal also increases (Fruit; Kruskal-Wallis test $X^2(2) = 32.924$, $p < 0.000$; Vegetables; Kruskal-Wallis test $X^2(3) = 26.085$, $p < 0.000$). Post-hoc analysis also shows significance between the higher and lower education levels and consumption of fruit and vegetables. Qualitative assessment of the household income data suggests that the trend in a greater consumption of fruit and vegetables amongst households with a higher educational level is consistent amongst children within households. Moreover, as educational levels increase the difference in consumption of fruit and vegetables between adults and children decreases. In households of lower educational level there is a greater difference in the number of portions consumed by children compared to adults, with children consuming a greater number of portions. However, as educational level increases the number of portions consumed by children and adults becomes more similar in number. This pattern may be explained by nutritional awareness and knowledge surrounding “healthy diets” and appropriate foods. Parents are aware of the importance of fruit and vegetable intake for their children but due to other influencers such as cost and availability, parents may prioritise the intake of fruit and vegetables for their children rather than themselves.

“Fruit and veg is so good for you, especially important for children. They’re natural and full of vitamins and minerals that the body needs. There’s no processed ingredients or bad fats or sugars. I make sure that every meal the kids have includes at least one or two portions of veg or fruit. They need it in their diets.”

(Barnard Castle mother BC102, 3 children)

Table 4.4: Mean portion of fruit, vegetable fast food/prepared foods, fizzy drinks, alcoholic drinks and meals eaten outside the home and results of Kruskal-Wallis analysis of portions of foods consumed by mothers per day by ration of car ownership to number of adults per household

Food Type	Education Level			Kruskal-Wallis		
	None - 2	3-5	6-8	Chi-Square	df	Sig. (p)
<i>n</i>	4	8	13			
Fruit	0.00	0.64	1.85	32.924	2	0.000
Vegetable	1.21	2.88	4.47	26.085	2	0.000
Fast Food/ Prepared Foods	1.36	1.07	0.30	33.314	2	0.000
Fizzy Drinks	0.54	0.34	0.14	16.119	2	0.000
Alcohol	0.54	0.64	0.49	0.560	2	0.756
Meals consumed outside the home	0.25	0.29	0.18	2.922	2	0.232

Higher educational levels are also associated with reduced consumption of fast foods and prepared foods (see Table 4.4) (Kruskal-Wallis test $X^2(2) = 33.314$, $p < 0.000$). Similarly to fruit and vegetable consumption, post-hoc analysis suggests there are associated differences between the highest and lowest education levels. Assessing the data qualitatively suggests that the pattern of greater intake of fast foods in households of lower education is similar amongst partners and children. However, this pattern is not necessarily a lack of understanding or education, but may instead be a factor of convenience, affordability and preference and is likely driven more so by household income and food environment in terms of the availability of fast foods than level of education.

Fizzy drink consumption shows a decrease as educational level increases (Kruskal-Wallis test $X^2(2) = 16.19$, $p < 0.000$) (see Table 4.4). Fizzy drink consumption, with respect to educational levels, follows similar principles to that of fruit and vegetable consumption, such that despite nutritional knowledge, other factors such as convenience and preference may be more influential than education and result in their consumption. Assessing the data of the other household members shows the same trend, with a greater consumption amongst lower educational levels, however, with children in households of all educational levels the number of portions consumed is greater in children than their parents.

“I know its [Coca-Cola] not good for their teeth but it’s a treat for them to have a glass at dinner or if we’re out. I think it makes them appreciate it more.”

(Tunbridge Wells mother BC102, 2 children)

Statistical analysis shows that there is no difference in consumption of alcohol and meals outside the home between educational levels. This is likely driven by personal preferences, economic accessibility and environmental accessibility more so than level of education. Therefore there is no pattern, significant or otherwise that can be explained either significantly or through a qualitative assessment.

Household education level is influenced and related to household income. The statistical analysis of education level between portions consumed and nutrient intake shows very similar results to the analysis by household income. The sample size of my data is too small to perform multi-variant analysis to assess these as confounding variables. However, as in the analysis of car ownership, I have split the data by household income and re-run the analysis to evaluate the extent to which household income and education levels are confounding.

Table 4.5: Mean portion of fruit, vegetable fast food/prepared foods, fizzy drinks, alcoholic drinks and meals eaten outside the home and results of Kruskal-Wallis analysis of portions of foods consumed by mothers per day by car ownership split by household income band

Food Type	No. cars owned			Kruskal-Wallis		
	0:0	1:2	3:2	Chi-Square	df	Sig. (p)
<i>n</i>	4	8	13			
Under £35k	3	3	-			
£35-70k	1	4	8			
Over £70k	-	1	5			
Fruit						
Under £35k	0.00	1.00	-	14.163	1	0.000
£35-70k	0.00	0.39	2.09	16.511	2	0.000
Over £70k	-	0.57	1.46	1.402	1	0.236
Vegetables						
Under £35k	1.38	2.29	-	2.329	1	0.127
£35-70k	0.71	1.61	4.07	14.214	2	0.001
Over £70k	-	9.71	5.11	9.306	1	0.002
Fast Food/ Prepared Foods						
Under £35k	1.29	1.76	-	0.186	1	0.666
£35-70k	1.57	0.79	0.34	13.667	2	0.001
Over £70k	-	0.14	0.23	0.138	1	0.711
Fizzy Drinks						
Under £35k	0.71	0.29	-	6.659	1	0.010
£35-70k	0.00	0.46	0.13	9.796	2	0.007
Over £70k	-	0.00	0.17	1.367	1	0.242
Alcohol						
Under £35k	0.19	0.19	-	0.495	1	0.482
£35-70k	1.57	0.79	0.39	11.048	2	0.004
Over £70k	-	1.43	0.66	3.137	1	0.077
Meals consumed outside the home						
Under £35k	0.24	0.29	-	0.120	1	0.729
£35-70k	0.29	0.25	0.18	1.586	2	0.452
Over £70k	-	0.43	0.17	0.708	1	0.400

Stratified analysis shows that there are significant differences between educational levels and the consumption of fruit in households with an income of under £70k (i.e. Under £35k and £35k-£70k household income bands) (see Table 4.5). Similar results are found in vegetable consumption, except the significant differences are found in incomes of over £35k (i.e. £35-70k and Over £70k) (see Table 4.5). Fast food, fizzy drink and alcohol consumption analysis at this level shows that there is significance only at the median household income level (£35k-£70k). Income and education are co-founding variables such that one will influence the other and have implications for dietary choices, such as fruit and vegetables as well as fast food and fizzy drinks. With regard to food consumed outside the home this stratified analysis shows that there is no significance present between education and these foods. Whilst nutritional education is an important factor in food choice, by understanding what constitutes a healthy diet, opposed to an unhealthy one, a more influential factor is culinary skills and experience (i.e. knowing how to cook and prepare foods).

“I’m all for trying something different but if you’ve never tried it before you don’t know how to cook it...I mean my mum always cooked, so I learnt from her, but I suppose if you’ve never been taught to cook it’s a bit daunting innit.”

(Barnard Castle mother BC101, 3 children)

As with household income, an increase in education level shows a higher diet quality. However, household income and higher diet quality are not mutually exclusive but instead are related variables. Education has been shown to influence income levels and other aspects of SES and vice versa. Therefore, educational levels alone, whilst influential, do not predict dietary choices. Instead other elements that make up an individual’s and a household’s structure and preferences. Socio-economic status is one of the most highlighted important influencers in food choice (e.g. Kittler et al. 2011; Rao et al. 2013; Aggarwal et al. 2011; Ulijaszek 2012; Monsivais et al. 2010; Thornton & Kavanagh 2010). A large number of studies have shown the impact of household income and education levels of particular dietary patterns (e.g. Tingay et al. 2003; Cassady et al. 2014; Attanasio et al. 2006; Griffith, Lluberas, et al. 2013; D’Angelo et al. 2011; Ard et al. 2007; Drewnowski & Darmon 2005; Kirby et al. 1995; Burt & Hertzler 1978). Using participant observation, participatory mapping in combination with food recalls the present study has evaluated the extent to which socio-economic status influences food choices in the four towns.

HOW DO DIFFERENT ASPECTS OF FAMILY LIFE AND WHAT OTHER FACTORS INFLUENCE FAMILY FOOD CHOICES AND FOOD-RELATED BEHAVIOURS?

This chapter considers the research questions what other factors, and specifically how aspects of family life influence food choice and food related behaviours in families. As previously discussed the factors that influence food choices and food related behaviours is a complex system of social, economic, personal and psychological influences (Blaylock *et al.*, 1999; Bove, Sobal and Rauschenbach, 2003; Drewnowski and Darmon, 2005; Carrigan, Szmigin and Leek, 2006; Kittler, Sucher and Nahikian-Nelms, 2011; Neumark-Sztainer *et al.*, 2015). It would therefore be challenging to identify all of the possible influential factors and discuss them in my project. Instead I have identified the most prominent themes and ideas that have emerged from my research in Barnard Castle, Consett, Tunbridge Wells and Chatham which I discuss in this chapter.

The social structure of a family and household has been shown to be influential in a number of aspects including education and wellbeing as well as food choices (McLanahan & Sandefur 1994). In particular, household influences include parental structure (e.g. sole parents, step-families), household size as well as routine and patterns. Data from my study shows that there are a number of family characteristics that influence food choices and related behaviours, including parental employment, parental control, food trends, convenience and generational or family influences.

5.1 Parental Employment

Parental employment has been shown to influence food choices for parents and their children (Burt and Hertzler, 1978; Borah-Giddens and Falciglia, 1993; Wardle, Parmenter and Waller, 2000; Rydén and Hagfors, 2011). In my study parental employment was shown to influence food choices and food related behaviours in two particular ways. Firstly, similarly to children's school and extra-curriculum activities, parents may work outside the town, and therefore the food environment with which the household interacts expands (see Figure 4.14). The possibility of encountering different environments may provide more, or different, options in terms of stores and food types available. Secondly, full and part time employment of both parents can reduce the time available, particularly to buy and prepare food.

"I normally pick up a few things up on my way back from work because it's on the way. It's easy. Or sometimes in my lunch hour."

(Barnard Castle mother BC101, 2 children)

"I do get a bacon roll from the café at the station every morning before work."

(Tunbridge Wells father TW107, 2 children)

"By the time I get in from work and sort the kids out, I really can't be bothered to cook properly. I normally cheat cook. You know oven chips or something."

(Consett mother CO102, 2 children)

"I don't work so I have the time during the day to think about what I'm going to cook and to prepare everything and I really enjoy that."

(Tunbridge Wells mother TW104, 2 children)

Time restrictions are amplified in the households with parents who worked in shifts, such as nurses, catering and civil servants. As a result, fast food and prepared foods become more commonly consumed due to their convenience.

"I work nights on Fridays so that leaves [husband] to sort the kids out on Friday night, Saturday morning and the afternoon 'cos that's when I'm asleep. They normally have a McDonalds or something 'cos it's easy and gets them out the house so I can sleep."

(Barnard Castle mother BC104, 3 children)

"I've been working nights on the roads so normally pick up a burger or something before we start at 7 and then some brekkie early morning."

(Chatham father CH102, 3 children)

For many parents in full or part time employment, especially where both parents are employed, nurseries and after school clubs are used. At nursery or clubs, food, or snacks, are normally provided which are most commonly 'healthy', such as fruit or vegetables. Therefore, children attending extra-curricular clubs and nurseries are provided with portions of fruit and vegetable. This further extends into schools as many schools in all four towns also provide fruit as a snack during the day.

"I mean the girls get fruit every day at [after school club] and that's all they do, so I know they're eating at least something."

(Consett mother CO101, 2 children)

Parental employment has a significant influence on food choice and diet related behaviours across all four towns. This is especially due to the reduced time available for food related activities, such as shopping and cooking and therefore, increasing the importance of convenience and time saving. Furthermore, the workplace may also expand the food

environment available to each household if areas, other than the town that they live in, are accessed.

5.2 Generational Influences and Family Traditions

Family life is fundamentally social, such that sociality is a major influence in many different aspects of life (Douglas, 1972; Firth, 2010; Skafida, 2012, 2013). In turn, features of family life can influence the social environment of the household. Fundamentally, this begins with upbringing and the generational influences that result from this. With specific reference to food choices and food related behaviours, this is most evident in recipes, food procurement methods and attitudes towards specific foods and activities.

“My mum and grandma taught me to cook.”

(Consett mother CO102, 2 children)

“We never had a lot of money when I was a kid so my mum had to be really careful. I think I learnt a lot from that – you know how to make not a lot go a long way by bulking it out. I mean I can’t understand why people buy jarred sauces, it’s so much easier and cheaper to make your own. But my mum taught me that, so I guess if you haven’t had that then tinned stuff is all you know.”

(Barnard Castle mother BC102, 3 children)

Whilst some imitate the food styles of their parents and grandparents, others model their choices to be the opposite. Incorporating other aspects of life, such as education, income and alternative social influences, some parents consciously differ from the food related choices made during their childhood.

"I don't think you cook like your mum at all. She is very much meat, potato and veg kinda lady. You are much more adventurous and try new foods and different ways of cooking. I can't imagine your mum ever doing that – it's too much out of her comfort zone."

(Barnard Castle father BC105, 3 children)

"Well my mum used to cook the same thing every Monday, every Tuesday, so it got a bit boring you know. You knew exactly what you were getting and it was dull. So when I left home one of the best things for me was to eat what I wanted not what was Monday. And I think [husband] enjoyed trying new things that neither of us got a home and never really got of it."

(Barnard Castle mother BC105, 3 children)

In relation to the use of the food environment, there is little evidence in my study that this is influenced by previous generations, mainly due to the extensive changes in food environments in general, but also specifically in each study site.

"I mean when I was a kid, there wasn't the supermarkets in town, just the butchers, grocers and such. So if you wanted to shop in town that's where you went. But there wasn't so much of the processed stuff as there is now, so you kinda needed to go to the shops because you had to buy the meat, the veg, the potatoes. It didn't come ready like it is nowadays."

(Tunbridge Wells mother TW109, 3 children)

"I've lived in Barney all my life and the town has changed SO much."

(Barnard Castle mother BC101, 2 children)

Nevertheless, for some households, parental upbringing has installed some concepts that have maintained. For example, routinely having a family meal on specific days of the week. In this study sample, there was little evidence of the ceremonious British Sunday roast (Douglas & Nicod 1974). Instead, the specific foods consumed are not so important but the social aspect of consuming the meal.

“We try to eat together as family every evening. It doesn’t always happen but we do try. Especially on a Sunday, you know, get the family together. Normally our parents come over and we catch up and get ready for the week.”

(Tunbridge Wells mother TW104, 2 children)

“Well [husband] works away during the week, so Sunday lunchtime is family time. It’s mandatory, although the kids don’t particularly like it. But otherwise we wouldn’t have any time as a family.”

(Barnard Castle mother BC104, 4 children)

The central unit of the family is a major focus of this project and has been shown to influence food choices and food related behaviours in terms of procurement, preparation and consumption. However, factors that influence and determine family structure and functionality, such as upbringing, culture and beliefs, can also have implications on food choices.

5.3 Parental Control

The relationship between parent and child is particularly influential from the impacts of the previous generation and the dynamics between child and parent in the present. In my study sample, some households with adolescents use food as a means of exerting control over the behaviour and activities of their teenagers. The need for this control is due the local food environment which promotes the use of fast food restaurants as place for social meetings with their peers. As a result, this promotes the consumption of fast food. This use of food to show parental control is specifically prominent in Chatham and Consett, where fast food store prevalence is high (see Table 3.2). Control is maintained by regulating money and permission to go to fast food stores in order to socialise. In most circumstances where this is the case, parents disapprove due to the cost as well as the increased consumption of ‘unhealthy’ foods.

“[Child A] goes into town with his mates most nights and weekends, and they hang out in McDonalds. I don’t get it but that’s what they do.”

(Chatham mother CH101, 4 children)

“Well kids tend to hang out in town. [Child A], well he’d be down there every night if he could but I don’t like it. They go to the McDonalds or KFC and stay there for hours. Then they’re full for dinner when they get home. It does my head in but that’s how they socialise. In my day we’d go to the park or something you know.”

(Consett mother CO102, 3 children)

However, parental control is not only exerted through control of teenagers accessing particular stores, but also using stores, especially fast food and confectionary stores, as ‘treats’.

“The kids have a takeaway or a McDonalds or something if [husband] and I are going out and the babysitter is coming round or my parents. It’s a bit of a treat for them. I wouldn’t let them have them all the time.”

(Tunbridge Wells mother TW105, 4 children)

“Friday is sweetie day. If we’re good all week then we get £5 to go to the shop and get what we want.”

(Consett child CO102, 3 children)

Where convenience foods are used as a ‘treat’, their consumption is much lower, such that a greater percentage of meals observed contained at least one portion of fast food or prepared foods in Chatham and Consett compared to Barnard Castle and Tunbridge Wells (see Table 5.1). Kruskal Wallis tests show that the differences in fast food and prepared food portions consumed between towns is statistically significant ($\chi^2(3) = 67.2333$, $p < 0.001$). Post-hoc analysis (Tukey HSD) shows that there is no statistical difference

between Barnard Castle and Tunbridge Wells but significance difference lies between the other towns.

Table 5.1: Percentage of meals containing at least one portion of fast food/prepared foods

	Barnard Castle (%)	Consett (%)	Tunbridge Wells (%)	Chatham (%)
Percentage of meals containing at least one portion of fast food/prepared foods	8.8	34.3	5.0	26.6

Within the home, fast food and prepared foods are also used as ‘treats’ or incentives in exchange for chores or good behaviour.

“I must admit I do use sweets and ice cream as a bribe. You know ‘if you tidy your room you can have a sweet’ or ‘stop hitting your brother.’ It is effective!”

(Tunbridge Wells mother TW104, 2 children)

Aspects of family life and the surrounding food environment influence the accessibility of particular food types and food stores. In order to maintain control over the use of fast food, convenience and confectionary stores and consumption of such foods, parents may restrict their children’s accessibility. As a result, household dynamics are important in determining food choices and the related behaviours to terms of family attitudes and beliefs, routines and composition.

5.4 Personal Preferences

Whilst structural factors such as socio-economic status and the local food environment are highly significant in determining which foods and stores are available, how they are used and the foods that are consumed, there is a more individual level of understanding. Both parents and children have individual preferences to foods and not only preferences to the type but also how that are prepared and consumed. Differences in preferences may be a result of structural influences such as SES, education or family exposure (Devereux et al. 2004; Burt & Hertzler 1978; Timperio et al. 2008) but there is also the possibility that they

arise from alternative factors and are unique to the particular individual. In many households, differences in preference manifest themselves in multiple meals being prepared each day to cater for all likes.

“I would say the most important thing that decides what I make is what everyone will eat. I mean I love seafood but nobody else does so I can only eat it when we go out.”

(Barnard Castle BC103, 4 children)

“What the family will eat is most influential.”

(Tunbridge Wells mother TW103, 3 children)

“We don’t always eat the same thing every night. [Child A] doesn’t like most sauces so I have to cook the chicken and then take a bit out for her. They’re all quite fussy. So it might be chicken but everyone will have different variations of it.”

(Barnard Castle mother BC103, 4 children)

This is not the case in all households and is mainly attributed to the cost and waste associated with producing multiple meals. Therefore, households that mention specifically cost and waste, restaurants and fast foods (takeaways) provide an opportunity for everyone in the household to eat what they like.

“I used to but now I cook one thing and if they don’t like it then they don’t eat. I was just wasting SO much food and cost a lot more.”

(Consett mother CO101, 2 children)

“It’s easier on a Friday to get a takeaway or go out ‘cos everyone can choose something they like.”

(Tunbridge Wells mother TW101, 2 children)

“The kids love McDonalds, and so do I, you don’t have to think what will he eat, but she won’t eat that. It can be tiring.”

(Chatham mother CH105, 3 children)

The importance of preparing and providing meals that everyone, particularly children, will enjoy and eat is also evident in the meals consumed within the school. Whilst all schools that participants attended in this study provided school meals, and for some households, free school meals, not all used this service. For some it was due to the economic savings provided by the free meals. For others, children did not have school meals due to preference for home prepared lunches. In some households this is further extended into some children choosing their own specific diets, specifically vegetarianism.

“They all have school meals ‘cos they’re free.”

(Chatham mother CH101, 4 children)

“When you’ve got three kids, school lunches are a god send. Saves you so much time in the morning to just get them out the door and know they’ll be fed.”

(Consett mother CH102, 3 children)

“I would love my kids to have school meals but they just won’t eat them so they come home hungry and eat me out of house and home so ends up costing me the same. Also they come home and eat crap so I’d rather give them a packed lunch with some healthy stuff in it.”

(Barnard Castle mother BC103, 4 children)

“Well [Child A] is a veggie – don’t ask – so that causes some...difficulties...logistically.”

(Barnard Castle mother BC103, 4 children)

“Yeah, one day [Child B] came home and declared she was a vegetarian. We thought she was joking but apparently not. I guess she is old enough to make her own decisions and it’s definitely opened me to new recipes and ideas.”

(Tunbridge Wells mother TW104, 2 children)

Personal preferences of parents and children are influential in determining specific food choices within the means of the households, such as income, education and the local food environment. In particular, the preferences of the children can drive specific alterations to the diet of the household as well as the individual. Teenage children in my sample use fast food restaurants and fast food consumption as a means of maintaining and forming social ties, however, my research and previous academic research has shown that the social networks in which an individual belongs are highly influential in determining which foods are purchased and consumed (Stroebele and Castro, 2004; Block *et al.*, 2011).

5.5 Social Networks

Food is highly social and the social circumstances in which food is procured, prepared and consumed can be influential in dietary outcomes (Douglas 1972; Douglas 2002; Christakis & Fowler 2007; Stroebele & Castro 2004). Eating together as a family is important to many households as a means of maintaining relationships within the household and between family members. However, food is also essential in maintaining friendships and social ties.

“I go out with my friends pretty much every week. We normally go into town. We like the Italian and Three Horseshoes [restaurant].”

(Barnard Castle mother BC101, 2 children)

“I use the cafes in town quite a lot. Juliet’s [café] is my favourite. I meet my friends there for a coffee or something after the school run or something. We also do PTA meetings on the High Street so I do use them quite a bit.”

(Tunbridge Wells mother TW101, 2 children)

“Every Monday I go to Piggy’s [café] for breakfast with some of the other mums.”

(Chatham mother CH103, 2 children)

Whilst restaurants are predominantly used for this, home prepared meals are also used, for example dinner parties. However, this is particularly dependent on the time available to prepare such meals as well as culinary skills.

“I love cooking and trying new recipes. That’s why I like to have our friends and [husband’s] work colleagues over so much. That’s what we really enjoy.”

(Tunbridge Wells mother TW109, 3 children)

“I would like to have people over more, especially with my new kitchen, but I don’t particularly like cooking or the time so it’s just easier to book a table in town. That way you don’t have to do the clearing up either!”

(Barnard Castle mother BC101, 2 children)

For some participants, food and eating out plays a large part of their business lifestyle. In turn, for households who experience new foods through the business lifestyle, new food ideas are introduced into the home.

“I would say that I eat out at least two or three times a week with clients.”

(Tunbridge Wells father TW107, 2 children)

“[Husband] is always eating up in town [London] and comes home with all these things he’s tried and wants to recreate at home. They do make some good ideas for when we have friends over.”

(Tunbridge Wells mother TW109, 3 children)

Furthermore, eating out is not only the consumption of food that is influenced by social situations but for some discussing recipes and food related experiences is part of the social relationship.

“I’m always sharing recipes and ideas with my friends. Or cookbooks. I have a lot of cookbooks.”

(Tunbridge Wells mother TW105, 4 children)

“I’m on a website, on Facebook called ‘Slow Cooker Sadoos’ which, pinch recipes off occasionally. I might comment if someone asks a question or has a good idea.”

(Barnard Castle mother BC102, 3 children)

Social relationships are also created and maintained within dietary programmes. Most programmes promote social support and provide groups whether in person or via social media groups.

“I do Slimming World on a Wednesday evening at the church. It’s really good for me and out of all the ones I’ve done I’ve lost the most weight over the longest time. I like it because there are lots of women there in the same boat and you can talk about things. Then there’s the Facebook page so you can post what you’ve eaten that evening and things. It’s a really social thing.”

(Barnard Castle mother BC101, 2 children)

However, whilst social networks are highly influential in where and what foods are consumed as well as recipe ideas, which stores are used are also highly socially dependent. A major aspect of deciding which store is used is the social perception of the store, especially supermarket chains. This is due to the statement of affluence that products from stores deemed to have a greater ‘affluence’ or social perception associated with the store.

“I don’t think I’d ever go to Lidl or Aldi. I’m not sure I’d trust the quality of the meat and things.”

(Tunbridge Wells mother TW107, 2 children)

“I use Marks and Spencer’s if I have people coming over.”

(Barnard Castle mother BC105, 3 children)

The importance of social networks in terms of influencing where and what foods are consumed is more prevalent in Tunbridge Wells and Barnard Castle as lifestyle aspects such as household income, provide the affordability to choose to use restaurants and other stores where food can be consumed outside the home. However, stores that allow foods to be consumed outside the home are also available options due to being geographically available, whether directly in the town or in other areas in the surrounding environments.

Social networks have previously been shown to influence health and dietary outcomes (Smith & Christakis 2008; Christakis 2004; Pachucki et al. 2011), and my data shows some of the mechanisms in which it does this. Food is important in maintaining social relationships by providing an activity to share, whether eating at a restaurant, café or within the home. Social networks also promote the distribution of food related ideas such as recipes, ingredients and stores and provide support for those on specific diets, whether health and weight-loss related. Furthermore, the social image of which foods are consumed and where they are purchased, specifically which supermarkets are used are highly influential in social relationships as well as food choices.

5.6 Cultural Aspects and Moral Beliefs

In addition to geographical, economic and social factors that may influence food choices and food related behaviours, some households also discuss the implications of ethnic, cultural and moral influences.

“My mother is Columbian, so I can deal with a lot spicier foods than [partner]. But I think it means that sometimes we eat things that are a bit different to everyone else.”

(Barnard Castle BC102, 3 children)

“I’m Swedish so sometimes we’ll have gravlax and things and probably eat a lot more fish than some people.”

(Tunbridge Wells mother TW102, 1 child)

Moral beliefs, which may or may not be related to cultural ideas, are also discussed as influences of food choice. One example of this is vegetarianism. Further examples include where and how the food is produced such as Fairtrade and the treatment of animals.

“I prefer to get food that is from around here. Especially meat and fruit and veg. You know support the local economy.”

(Barnard Castle mother BC106, 2 children)

“I would only ever buy Fairtrade bananas and chocolate and things. I think that every little bit does help...And things like caged hens. Well no, I’d only buy free range eggs. I am quite conscious about things like that.”

(Tunbridge Wells mothers TW102, 2 children)

Therefore, despite being slightly more expensive, the importance of the local community, specifically in Barnard Castle, and personal moral and ethical beliefs, such as those demonstrated in Tunbridge Wells drives a desire to purchase foods produced locally. In addition, consuming locally sourced foods may also be a result of preferred taste or health concerns. Therefore, the factors influencing the choice of locally sourced foods may also explain why some supermarkets are chosen over others, due to the foods they stock which adhere to moral beliefs and the importance of the local community.

5.7 Food Trends

Another repeatedly discussed theme of food choice was that of trends. As with other global markets, the food market is also susceptible to particular trends of specific foods as well as diet plans and patterns.

“I mean recently there’s been this love of avocado. I don’t get it completely but everywhere you go there avocado this, avocado that. I guess it could be something worse but I’ve eaten a hell of a lot of avocado recently.”

(Tunbridge Wells father TW107, 2 children)

“There was that Atkins diet then the Paleo diet, so no processed foods, cereals or dairy and now there’s the 5+2 diet. It’s always changing and sooner or later something better comes up and the last one is really bad for you...but I struggle with my weight so I’m often on these things. So my diet changes depending on that but it doesn’t really affect the others.”

(Barnard Castle mother BC104, 4 children)

As a result, particular food trends can create specific, and time sensitive, preferences to food choices and dietary patterns, which are actively sought in order to comply with food trends. These trends may be followed by parents but also by children, who then place ‘pressure’ on their parents to purchase and consume these foods.

5.8 Convenience

Convenience has previously been described and related to allowing a reduction in time and energy (or effort) required to prepare and procure foods as well as cleaning afterwards (Becker, 1965; Carrigan, Szmigin and Leek, 2006; Buckley, Cowan and McCarthy, 2007). As a result, convenience relates to accessibility of stores, availability of foods within stores as well as particular foods that often refer to prepared, or partially prepared foods.

Households in every town in my study highlighted the importance of convenience in all aspects of their life, not only in food related behaviours. For households with children specifically convenience is important to save time and energy to maintain the demands of parenting, work and other lifestyle factors (Becker, 1965; Redman, 1980; Lake *et al.*, 2006). As such convenience is appreciated in two aspects, location or proximity of the stores and via the use of convenience foods. Stores that are in close proximity to the home, work or other locations of interest, such as extra-curriculum activities and family members are used for their ease of access. This is often determined by the local food environment and the pre-determining factors which result in the composition of such environment, as well as personal preferences towards the stores in close proximity and the ease of accessibility to other stores in other parts of the environment (Caspi *et al.* 2012; Morland *et al.* 2002; Thornton & Kavanagh 2010; Hoek & McLean 2010; Gallo *et al.* 2014).

*“I go to Morrison’s mostly because it’s so **convenient**. It’s right next door.
It’s difficult to miss.”*

(Barnard Castle mother BC101, 2 children)

*“Convenience stores are the ones that you find in strange places like at
the end of a road that look a bit like it should be a house and they’re
always open.”*

(Barnard Castle mother BC101, 2 children)

In addition, convenience foods can play an important role in maintaining convenience within a lifestyle. Convenience foods are used to save time and energy, particularly in food preparation and clearing away afterwards (Buckley *et al.* 2007; Carrigan *et al.* 2006).

*“On a Friday we would normally have a takeaway or McDonalds, KFC
because it’s just so convenient. I know it’s not very healthy but it’s easy
before we go out.”*

(Consett mother CO104, 3 children)

However, in the sample of my study there were differences in attitudes towards and use of convenience foods. Buckley, Cowan and McCarthy (2007) defined four convenience food lifestyle types; food connoisseurs, home meal preparers, kitchen evaders and convenience-seeking grazers. For 'food connoisseurs' saving time and energy in food related activities is not important and tend to view convenience foods to be 'unhealthy'. The next category is 'convenience-seeking grazers' whereby individuals in this category actively and readily choose convenience foods to make their lives easier and tend to view convenience foods as 'value for money' and any extra cost is worthwhile in the time saved. Whilst participants in this study may not be able to categorise easily into these four categories or groups, the ideas on which they are based can easily be identified in this sample. There is a clear divide between towns and some households in their attitudes towards convenience foods. Some were expressively against using convenience foods because of their dietary quality and variety as well as pleasure from cooking and preparing foods. On the other hand, other households included convenience foods regularly within their diet for a number of reasons such as taste preference, time saving, catering for all preferences within the household and that they do not require culinary knowledge.

"I personally would consider convenient foods anything that isn't homemade. You know, at restaurants you know it's been homemade with fresh ingredients so it's like what you would cook at home. I'm not too keen on anything that has been mass produced – it doesn't quite sit right with me. I'd rather make my own sauce and cook my meat or make my own chips that buy something and not know exactly what's gone in it."

(Tunbridge Wells mother TW102, 2 children)

The factors that determine whether or not households choose to use convenience foods are a result of a number of lifestyle aspects such as socio-economic status, social and cultural influences, household structure and geographical positioning. However, for some household's time and effort saving methods whether in terms of where food is procured or foods prepared and consumed are very important in order to free this time to spend on other activities. For many households foods which provide convenience in terms of time and energy must be balanced with their desire for a high quality and varied diet.

5.9 Diet Quality vs. Diet Variety

In addition to convenience, the importance of diet quality and variety in households differs considerably between food environments and other household factors such as preference and socio-economic status. Diet quality is higher in some households than others as some actively and consciously seek 'healthy' diets whilst for others the local food environment promotes high diet quality. Table 3.3 shows that the percentage of stores in each town which sell fresh vegetables and fruit is highest in Tunbridge Wells whilst fast food, tinned foods and microwavable foods were most prevalent in stores located in Consett and Chatham, towns of lower socio-economic status. Consett and Chatham seem to promote 'healthy' diets by making 'healthy' diet items available to purchase within the local food environment. This is transpired in food recall analysis which shows that in the towns with greater availability of fresh fruit and vegetables, higher consumption of fruit and vegetables is found and similarly for those with greater number of stores selling 'unhealthy' food items (see Table 3.4).

Secondly, personal preferences in a number of different aspects including taste, lifestyle, health and household preferences. Favoured tastes, or dislikes, can drive particular food choices which may, or may not, promote diet quality and variety (Skafida 2013; Stroebele & Castro 2004; Kittler et al. 2011; Marreiros & Ness 2009). Furthermore, this may be part of household or individual lifestyle choices, where leading a healthy lifestyle is particularly important, such as exercise and diet (Turrell 2010; Popkin et al. 2005).

"[Husband] does a lot of sport so likes to look after himself."

(Barnard Castle BC102, 3 children)

Another important aspect of food choices is dietary variety and the willingness to try different tastes and foods. This is, in part, driven by exposure to different tastes and foods, which may be during childhood or an individual desire to seek variety. In some household's children are encouraged to try new foods due the access and affordability to such foods. This is more often than not driven by parental desire to experience different foods and meals. The cookbook was an item that reoccurred in data collection. The cookbook provides a number of new recipes, most with a particular theme such as vegetarian, healthy or cultural. For some the cookbook always aids teaching children culinary skills and to

experiment with food. The importance and substantial role of the Internet and social media has provided another medium to find and share recipes and ideas. However, this is dependent on the desire and willingness to experiment with foods as well as basic culinary skills to prepare meals.

“Welcome to my cookbook library! They are really useful because we’re trying to get [children] to cook more. So we let them go through and choose something they want to cook.”

(Tunbridge Wells mother TW105, 4 children)

For other households, where culinary skills may be lower, supermarkets play a substantial role experiencing new foods by the foods that provide and particularly those they promote with deals or advertising. Participants were more willing to try new foods and brands when they were discounted or shown in a particular way.

“So every week they do a different bread at Morrison’s on a deal. So that’s good to try new things.”

(Barnard Castle mother BC101, 2 children)

“Tesco and ASDA sometimes do tasters or the recipe cards which are good to try new things. Otherwise it gets a little bit samey.”

(Consett mother CO102, 3 children)

The local food environment and food recall data have highlighted the differences between the geographical food availability and consumption in terms of diet quality and variety, which varies between study towns, socio-economic status as well as household preferences and lifestyles. Combining these differences and nutritional patterns, participant observation and participatory mapping have demonstrated some more of the rationale as to why households choose and seek healthy diets and why others do not. Most important is the observation that all households in all towns were aware of what constitutes a healthy diet, for example consumption of fruit and vegetables and reduced consumption of fatty

and high calorific foods. Despite this other additional factors, such as cost, availability and preference determine whether such diets are actually procured and consumed.

5.10 Structure of the 'Meal'

One observation I made throughout my time with the families in the four towns, was the difference between households in what they understood as a 'meal' opposed to a 'snack' and where 'meals' were consumed. Conceptualising the meal and a 'structured' event was described in detail by Douglas and Nicod (1974). They distinguished a meal from a snack by the potato/cereal dichotomy and as a social event. How the 'meal' was defined differed substantially between households. Households in Tunbridge Wells and Barnard Castle considered a meal to be comprised of meat (or substitute for vegetarians), vegetables and a carbohydrate such as potato or pasta. This was often eaten together at a table with the entire family present as a way of maintaining regular contact with the family and discuss their days and any other points of interest. For most the mothers of households in Tunbridge Wells and Barnard Castle this was very important to them, particularly when they had older children who were becoming more independent.

However, for some other households there was no such 'concrete' definition of a 'meal' compared to a 'snack'. Instead meals were more likely defined by the time of day they were consumed, opposed to the individual food items that they comprised of. For example, anything eaten before work or school, irrelevant of what it is, was defined as breakfast. The unstructured understanding of a 'meal' often projected into an unstructured event, such that more often than not, meals were not consumed with the family and not around a table. For some households this was because they did not have a table whilst others preferred to sit in their living room in order to watch TV. The family not eating around the table was most commonly due to shift work or individual schedules that meant that very rarely were the entire household present in the home at the same time in order to eat a meal together. Although I did not measure the impact of this on dietary patterns specifically, Skafida (2012) has previously shown that mothers who felt that mealtimes provided 'quality time' with their children, often meals eaten around the table, had healthier diets. The meal structure within the home and the differences of the importance placed upon meals within the family show differences in how a meal is defined and where and with whom a meal is eaten, which can

also help to explain the differences in food choices observed both within and between households.

5.11 Summary

Family life is dynamic and multi-layered with the combining of socio-economic, generational and cultural influences in addition to the individuality of each member of the household. My study has shown that there are a number of different factors that are influential in determining food choices in both parents and children including personal preference, convenience as well as the importance placed upon the need for high quality and varied diets. Parental employment not only influences household income and aspects of socio-economic status, it also determines the time available to be spent on food related behaviours such as shopping and preparing food. Generational influences, family traditions, culture and moral beliefs provide a basis for particular preferences or knowledge of certain foods, preparation techniques or other food related behaviours within given budgets and time capacity. This may then be reinforced or recreated by others within a social network or as food trends vary. Food can therefore not only be used a symbol of tradition, culture or socio-economic status but is also used a means of control over children by their parents. All of the above inter-related factors influence where households purchase their food, how their food is prepared and what is ultimately consumed.

DISCUSSION

The mixed-method and multi-dimensionality approach of my study has underlined the complexity of food choice and food related behaviours in four British towns. In particular, I set out to answer:

1. How do local food environments differ?
2. How do people use their local food environment?
3. How do aspects of socio-economic status influence family food choices and food related behaviours?
4. How do other aspects of family life influence family food choices and food related behaviours?
5. What other factors influence family food choices and food related behaviours?

The chosen study towns provide a means to assess how local food environments and food choices differ between areas of similar geography as well as between areas of higher and lower socio-economic status.

Combining four well-established methods provides a broad understanding of the complex system of food environments and the implications of food choices. Influential factors create a complex and dynamic network of interesting aspects at an individual, household and community level driving food choices in terms of procurement and consumption as well as nutritional intake. Systems theory provides a theoretical framework in order to account for the interacting factors (Phillips, 1999; Diez Roux, 2011; Luke and Stamatakis, 2012) but distinguishing each factor individually is challenging, as there is clearly heterogeneity in how people use their local food environments. Individuals are part of a dynamic system of inter-related factors including their personal preferences, geography, social and political systems. Systems theory allows an appreciation of how each factor influences food choices but also the relationship to other aspects of an individual's life.

Local food environments differ between each study town in terms of store dispersal, accessibility, density and store types available. In turn, this influences the stores used by residents and the nutritional intake of households. By understanding how a local food environment is created can allow an appreciation of how it is used and its level of acceptability (Thornton and Kavanagh, 2010). Glanz *et al.* (2005) have previously divided local food environments into three major categories; 1) the community environment – including the number, type, location and accessibility of food stores; (2) the organisation environment – relating to the food stores within a particular setting, for example school or work; (3) the consumer environment – the availability, cost and quality of food within the local environment (Glanz *et al.*, 2005; Kelly, Flood and Yeatman, 2011). This categorisation acknowledges the social, individual and geographic aspects of food stores within a local food environment. These three structured categories can contribute to the understanding as to how the local food environment influences our habitus and how each environment is used.

It is evident from the geographic information system data that there are differences in the local food environments of the four towns, particularly in terms of which foods and stores are available and their location within the town. In Kent, the ‘community environment’ shows that both Tunbridge Wells and Chatham have a much greater food store density than the towns in County Durham. In Tunbridge Wells which has a higher household income and a lower IMD score, there are two areas of high store density in the town centre, compared to Chatham, which has a lower income where there is an area of high store density but also a dispersion of stores elsewhere in the town. In Barnard Castle, which also has higher household income, there is one highly dense area within a small proximity of the town centre and very little dispersal elsewhere, compared to Consett of a lower income. Consett is similar in design to Chatham with areas of density but a greater dispersal in other parts of the town.

It has previously been noted that local food environments differ as a result of local politics, demographics and demand (Wells and Watson, 2005; Thornton and Kavanagh, 2010; Caspi *et al.*, 2012) resulting in differences in the presence of particular stores, store density and proximity (Thornton and Kavanagh, 2010; Caspi *et al.*, 2012). Food environments are susceptible to demand and stores rely on regular custom (Wells & Watson 2005). As a result, preferred stores and those that meet the needs of their customers are most likely to be present in a given area. Customer needs may be food quality, affordability or convenience and therefore, the local food environment can often represent the influence of

each of these factors in relation to how each is considered and weighted by residents. Differences in the needs and preferences of households may drive the design of local food environments, or alternatively it may be the set up of the environment that drives individuals to live in a particular town. However, the directional relationship between food environment and individuals is not so explicit as this, but instead is constantly influenced and influencing a dynamic and reciprocal network of factors with the residents within each environment.

Much academic literature has shown that the presence of particular store types within a local food environment, as well as in my own work, is influenced by socio-economic status (Popkin, Duffey and Gordon-Larsen, 2005; Cummins and Macintyre, 2006b; Morland, Diez Roux and Wing, 2006; Liese *et al.*, 2007; Macdonald, Cummins and Macintyre, 2007; Hoek and McLean, 2010; Thornton and Kavanagh, 2010; Gallo, Barrett and Lake, 2014). Gallo *et al.* (2014) studied the local food environment of UK schools and found that areas of deprivation had significantly more convenience stores than those of higher income. Furthermore, the work of Cummins *et al.* (2005) which surveyed all McDonalds fast food outlets in England and Scotland also found that areas of deprivation had a greater number of fast food stores than in areas of higher socio-economic status. When looking at the store and foods available within each town in my study there are also clear differences by socio-economic status. Consett and Chatham, areas of lower socio-economic status show more similarities in the physical arrangement of the local food environment than Barnard Castle and Tunbridge Wells. Barnard Castle and Tunbridge Wells, areas of higher socio-economic status have a greater relative number of stores providing fresh fruit and vegetables and fewer fast food or convenience stores, compared to Chatham and Consett of lower socio-economic status.

Differences in each local food environment also then translate into differences in how people use these environments. In many households in my study, areas of high store density were preferred as they allowed access to a number of different stores within a small time frame and with little effort required to move from one area to another. As a result, these high-density areas of stores are identified as where the majority of food is procured within each town. This has also been noted by the work of Miller (2001) and Kelly *et al.* (2011). The development of large retail parks have altered local food environments and have created smaller food environments within towns. These retail parks were described in my study as convenient in terms of the stores available, which often include other store types than food stores, as well as being places to socialise. In particular the importance placed upon supermarkets, and the monopoly like status supermarkets have in where

households procure their food is highly influential in understanding how and why local environments differ as well as their influence in food choices and food related behaviours (Chaix *et al.*, 2012; Costa *et al.*, 2013). The implications of using large supermarkets as the primary location for food procurement can influence shopping behaviours by the services they provide and products they sell. The shopping choices people make are in some part swayed by what is available within the supermarket more so than personal choice (Timmer 2009). The use and dependence on supermarkets is also not purely a result of geographic positioning or socio-economic status of the food environment. Supermarkets provide many commodities and services in one location encouraging customers to use these stores as they do not have to travel to other smaller stores in order to procure all that they need (Wells and Watson, 2005). In Consett the use of the hypermarkets allows for many different chores and commodities to be purchased and organised within one trip. In addition, many stores also have cafes and therefore provide a means of socialising, similar to the use of cafes and restaurants in Tunbridge Wells and Barnard Castle. In some towns supermarkets and large retail parks are located within the town centre or areas of higher density, whilst for others these were located outside the town. Where households had the means to access the stores outside the town or town centre these stores would be used. However, in other towns where access to supermarkets was more difficult (e.g. Chatham) due to location but also affordability in access, other types of food stores were used more so.

Areas where there is a lack of accessible supermarkets, but a greater number of convenience foods have been described as 'food deserts' (Mooney, 1990; Sooman, Macintyre and Anderson, 1993; Barratt, 1997; Cummins and Macintyre, 2002; Guy, Clarke and Eyre, 2004; Pearson *et al.*, 2005; Morland, Diez Roux and Wing, 2006; Chaix *et al.*, 2012). Being in closer proximity to a supermarket has been associated with higher fruit and vegetable intake and higher quality dietary habits (Cummins and Macintyre, 2006b; Chaix *et al.*, 2012). In the towns with the greatest number of supermarkets present, Tunbridge Wells and Barnard Castle I observed higher intakes of fruit and vegetable. Supermarkets were preferred stores to purchase food in, compared to other store types, as they provided all food types conveniently in one place as well as variety in the foods available. In Chatham, stores in close proximity to the family home were in low store density areas and therefore the choice of food store was reduced.

Seeking areas outside the immediate food environment is significantly dependent on car ownership as this provides a way of accessing areas that are not easily accessible by walking or public transport. As such those without access to a car are restricted to within

their local food environment and most likely to use those in close proximity to their home or school (Pearson *et al.*, 2005; Carrigan, Szmigin and Leek, 2006; Thornton and Kavanagh, 2010; Gallo, Barrett and Lake, 2014). In Chatham due to restricted access to public transport and cars respondents are only able to purchase food within the town and are then limited to buying what they can carry home. Depending on which stores are available within close proximity to the home will therefore determine which foods are purchased and consumed (Morland, Diez Roux and Wing, 2006; Thornton and Kavanagh, 2010; Kelly, Flood and Yeatman, 2011; Caspi *et al.*, 2012). It is in the town centre that supermarkets are also located and many respondents in my study did not live close to the town centre and therefore were more reliant on stores in close proximity to their home. The local food environment therefore promotes the use of convenience and fast food stores in Chatham. The store types in these areas are significant in determining which foods are purchased and consumed. In Chatham and Consett, those stores in close proximity to the home tend to be convenience stores and fast food restaurants. Households in Barnard Castle have a strong preference to shop outside the town but are able to do so because they have access to a car, which allows them to travel to other towns such as Bishop Auckland. The preference to shop outside the town is due to convenience as many work or regularly visit these areas for after-school clubs in addition to preference for the stores located in other towns that are not available in Barnard Castle. However, in Chatham there is a reduced access to cars, which prevents individuals from seeking areas other than those within walking distance or is able to access via public transport. As a result, households in Chatham often shop more regularly than households in other towns due to logistical issues such as carrying the shopping home. In turn, this promotes the use of foods and stores that are within close proximity to the home. In addition, in Chatham these stores in close proximity allow parents to leave their children at home whilst shopping, seen as a benefit, or otherwise send older children to the store in their place, therefore saving time. On the other hand, in Tunbridge Wells GIS data shows stores located outside of the immediate town centre and highly dense areas to be dominated by supermarkets and restaurants. For households where these stores are the closest to their home, the presence of supermarkets and restaurants encourages their use, opposed to convenience and fast food stores found in Chatham.

Needless to say, supermarkets are not the only store type where food is procured and therefore do not give the whole picture of how people interact with their local food environment. In Tunbridge Wells, many households used greengrocers and butchers to purchase particular food types. This is driven by the preference for a higher quality and diversity of foods. Whilst in Chatham, as previously discussed, there is a high dependence

on convenience stores and fast food restaurants. The presence of convenience and fast food stores and lack of supermarkets tend to be found in areas of lower socio-economic status. In particular, convenience plays a pivotal role whereby food and food related behaviours that save time and energy are sought and preferred (Bove, Sobal and Rauschenbach, 2003; Carrigan, Szmigin and Leek, 2006; Jetter and Cassady, 2006; Lake *et al.*, 2006; Buckley, Cowan and McCarthy, 2007; Timperio *et al.*, 2008; Thornton and Kavanagh, 2010; Gallo, Barrett and Lake, 2014). In all four of the study towns, convenience stores and foods were actively sought as means of saving time and energy. This is most prevalent in Consett and Chatham as these local food environments provided the availability of such stores in close proximity to the home.

In assessing the extent to which socio-economic status influences family food choices and food related behaviours, it is important to acknowledge that socio-economic status is a measure of household position in terms of their economic and social standing and agency. Nutritional knowledge, in terms of what constitutes an appropriate diet as well as the accompanying skills and experience to prepare foods has been significantly associated with healthy eating (Wardle *et al.* 2000) and as a result has been used as a target in public health policies. Dietary knowledge is mainly gained from parents and others in social networks as well as institutional education (Caraher *et al.* 1999). Having knowledge of, and understanding, what constitutes an appropriate diet as well as how to procure, prepare and store foods is important in how people make food choices (Caswell & Yaktine 2013; Wardle *et al.* 2000). For households in Barnard Castle and Tunbridge Wells education levels and the understanding of nutrition discouraged the use of convenience foods, as parents were aware of the poor nutritional values provided by the food sold in these stores and therefore did not include them in their diet. The use of convenience stores and fast food restaurants is instead a result of a combination of factors including their acceptability as appropriate places to consume food and the reduced time pressures they provide (Carrigan, Szmigin and Leek, 2006; Buckley, Cowan and McCarthy, 2007). This therefore encourages healthier diets in Tunbridge Wells than Chatham and Consett. Higher intake of convenience foods were observed in Chatham and Consett, compared to Tunbridge Wells and Barnard Castle.

On the other hand, parental employment plays a key role in the time available to shop for food and as such convenience becomes a key factor in order to save time and money (Lake *et al.*, 2006). In Tunbridge Wells many mothers spoke of shopping and preparing food as their 'job' and their enjoyment of doing so. However, in Consett time pressures as a result of employment make shopping and cooking feel more like a chore. Parental employment

also expands the accessed areas and may provide a convenient means of accessing other food environments outside the town they live in. In Barnard Castle, mothers working in other towns would use these towns to purchase food due to being closer and more convenient than going to stores in Barnard Castle. In addition, these towns were often where children had extra curriculum clubs.

The greater availability of stores providing fruit and vegetable as well as the financial means, educational understanding of their nutritional value and preference to purchase and consume fruit and vegetables suggests that there is a greater consumption in local food environments and households of greater socio-economic status. This is translated in the food recall data for households between towns. Households in towns of lower IMD score as well as higher household income have a greater intake of fruit and vegetables but also a reduced intake of fast foods. As a result, healthier diets, defined as those with high intake of fruit and vegetables, may be more explicitly related to cost, such that 'healthier' diets are more expensive to implement within the household (Drewnowski and Darmon, 2005; Jetter and Cassady, 2006; Griffith, O'Connell and Smith, 2013; Rao *et al.*, 2013). There is a large volume of research that shows that household income influences dietary patterns, such as increased fruit and vegetable consumption and reduced use of fast food restaurants (Ryden & Hagfors 2011; Monsivais *et al.* 2010; Cummins *et al.* 2005; Kittler *et al.* 2011; Sooman *et al.* 1993; Andreyeva *et al.* 2010). Household income influences dietary patterns by providing the capital to spend more money on food, often higher quality diets.

Nevertheless, the intake of higher quality diets is not only a result of their availability, or lack of availability. Instead, their consumption is dependent on personal preference and nutritional education. In Tunbridge Wells the 'organisation environment' (as described by Glanz *et al.* (2005)) is often traded in favour for the preference for high quality foods that also comply with moral beliefs. Households in Tunbridge Wells visit stores that are not necessarily the most convenient or closest to access in favour of purchasing organic and local produced foods. On the other hand, in Chatham a lack of agency, afforded by income and the ability to access stores restricts the choice households have in terms of choice and as a result are confined to the 'community' and 'organisation' environment.

Differences in local food environments are informed by more complex factors than crude measures such as household income and education levels. Other 'immeasurable' factors are also integral to the complexity of food environments and food choices, in particular culturally and socially defined factors (Popkin, Duffey and Gordon-Larsen, 2005; Thornton

and Kavanagh, 2010; Gallo, Barrett and Lake, 2014). My research questions sought to assess the extent to which socio-economic status in addition to other factors influence food choices and food related behaviours. In Barnard Castle and Consett many mothers spoke of being taught to cook by their mothers and grandmothers and as a result cooked and prepared similar foods. Other cultural differences, such as one mother who is Swedish or another who is Columbian, popular foods from these areas and cultures were purchased and prepared for their families. Others, particularly in Tunbridge Wells highlighted the importance of their social groups in trying new foods and recipes but also the importance that food played within their social group. Cooking meals and using food stores such as restaurants and café are highly significant in maintaining social networks and relationships in Tunbridge Wells and Barnard Castle. The appeal to use restaurants and cafes is matched in these town by the presence of these stores, more so than in Chatham and Consett. Therefore, the stores that are used within a local food environment are not only dependent on the geography of particular stores but the foods and stores that individual's actively seek to meet other needs and preferences. Thornton and Kavanagh (2010) discussed the elements considered to be influential in understanding how local food environments are used. One element was acceptability. Acceptability acknowledges the need for the local food environment to provide stores and foods that meet the needs of the individual's living in it, for example cafes and restaurants for people living in Tunbridge Wells.

Miller (1998; 1998) further argues that the decisions as to where we shop and the food we procure is not only a result of convenience or resource but also a projection of our household. The act of shopping and consumption has been suggested to also be an expression of sociality and individuality, described as “an act of love and care” by providing for the family as well as parental control (Miller *et al.*, 1998; Kelly, Flood and Yeatman, 2011; Skafida, 2013). For example, in Tunbridge Wells and Barnard Castle the supermarket chain choice was important in determining which stores they purchased food from. This was a combination of the foods provided as well as the social status that is associated with the particular chain.

The enjoyment associated with food shopping differed between households. In Consett and Chatham some mothers strongly dislike the act of shopping and is perceived as a chore whilst others in Tunbridge Wells, Consett and Barnard Castle enjoy the experience of purchasing and feel as though they are providing for the family. The shopping experience is also a means of showing generational influences as well as ethical, moral and cultural beliefs as some respondents choose particular stores to support their local community or

because their own parents had used similar store types (Wells and Watson, 2005). In Tunbridge Wells this was a strong influencing factor for the stores chosen and the foods procured. Particular food stores were purposely used because they stored locally produced and Fairtrade foods. This was also the case in Barnard Castle where many households spoke of their preference of locally produced foods. However, in Barnard Castle the affordability of such foods is often a barrier to purchasing and consuming them regularly.

Another important aspect for respondents in my study in relation to food and eating was the 'structure' of the meal. In Tunbridge Wells and Barnard Castle specifically eating as a family around a table was an integral part of family life. Whilst in Chatham often the functionality of having a table in the home and the convenience of eating at different times meant that food was shared together as a family rarely. A 'structured' meal has been shown to be important for promoting eating together as a family and provide 'quality time' together (Douglas and Nicod, 1974; Mennell, Murcott and van Otterloo, 1992; Caplan, 1997; Murcott, 1997; Skafida, 2012, 2013). Skafida (2012, 2013) has previously shown that meals eaten around the table tended to encourage healthier diets. Eating together is also important socially in maintaining social networks and relationships within the family and with others. In many households I observed, meal times could be stressful for parents with young children when a child refuses to eat a particular food type. Therefore, meal times become an interesting place to observe the parent-child dynamic and parental control (Mintz and Du Bois, 2002; Ogden, Reynolds and Smith, 2006; Brown *et al.*, 2008). For many households, it is easier to give in to their children in preparing and consuming the foods they prefer than to battle against them in order to save time and effort (Skafida, 2012, 2013).

In addition to his work on habitus, Bourdieu (1984) has also written on the idea of taste. By taste, Bourdieu refers to tastes in art, clothing as well as food. He suggests that taste is a social construct to indicate social class. Those of higher socio-economic status have a greater level of choice which a higher income and education can provide. Taste and food-related behaviours as a projection of social class is particularly evident in supermarket use (Wells and Watson, 2005; Lindstrom, 2008; Wallop, 2013). In Tunbridge Wells, the local food environment provided a number of different chained supermarkets, however there is a strong preference for particular chains. This is attributed to the social standing that particular stores represent and in Barnard Castle, where there are only two supermarkets present, one of the deciding factors for using stores outside the town is for the same reason. However, in Consett and Chatham, people are restricted within their food

environment and can only use what is available, especially with those who do not have access to a car or public transport and as a result have a reduced “freedom of choice.” The concept of “freedom of choice” is important in understanding how local food environments are used. Data from the four study towns suggests that household socio-economic status determines the extent to which they have a “freedom of choice.”

Glanz’s (2005) categorisation of local food environments is reflected in the findings of my own study. Data suggests that these three categories of a local food environment create a “trade-off” depending on the importance placed upon other aspects of a household such as income, employment, personal preferences and moral beliefs. The community environment, as measure by GIS methods, provides a basis of what is available within the local food environment. For example the store and food types and their density and clustering, which are obviously different between the four towns, as previously discussed. However, how the community environment is used is dependent on the importance placed up particular aspects of the organisation and consumer environment. Store use is not only influenced by socio-economic status but also social and cultural factors, including aspects of family life. As a result, the factors considered most important by a household, which will differ based on family dynamics, culture and personal preferences, as well as socio-economic status will influence how the food environment is used. For example, in Barnard Castle convenience of the 'organisation environment' (stores close in home or extra-curriculum cubs) are preferred over proximity to the immediate food environment in the town centre. Kelly et al. (2011) conducted a literature review and found that previous studies that have focused on the community environment record the physical environment, often using GIS methods. On the other hand, those studies that focus on the organisation and consumer food environment provide a complex system critique of the environment by assessing the factors that influence availability, affordability and how this relates within the food environment. By combining qualitative and quantitative methods I have been able to appreciate the complex system and understand how all three categories (community, organisation and consumer environment) are related and dependent on one another. For example, in Barnard Castle the physical food environment shows food stores that are available and in one area of high density, promoting a convenient shopping experience. It could, therefore, be seen as an appropriate local food environment for households with families. However, by assessing the organisation and consumer food environment the stores within the town are not used but instead stores outside of the town are sought. This is a result of other inter-related factors such as convenience and preference in the presence of having the means to do so, such as car ownership and higher household income, which

allow individuals to be able to shop outside the town. The greater capital a household has in terms of household income, nutritional knowledge and store availability, the more selective individuals can be in seeking diets that also reflect personal preferences, generational influences and food trends.

6.1 Limitations of the study

6.1.1 Geographic Information Systems (GIS)

The use of Geographic Information Systems (GIS) is becoming increasingly popular in providing the geographic context of many health determinants including physical activity (Frank *et al.*, 2006; Diez Roux *et al.*, 2007; Cleland, Timperio and Crawford, 2008; Turrell, 2010) and dietary based outcomes (Cummins and Macintyre, 2006a). Studies that are concerned with the physical environment as measured using GIS methods tend to either compare the physical environment to health indicators such as BMI (Block and Kouba, 2006a; Chaix *et al.*, 2012), whilst others show the availability of certain food types such as fruit and vegetable (Pearson *et al.*, 2005; Liese *et al.*, 2007; Costa *et al.*, 2013; Cassady, Jetter and Culp, 2014; Gallo, Barrett and Lake, 2014; Hillier-Brown *et al.*, 2014).

There have been recent developments which show area-level interventions to be more influential than those that target individuals (Christakis, 2008; Thornton and Kavanagh, 2010). However, GIS methods do not allow for an examination of the social and individual dimensions of these trends or the directionality of the relationships (i.e. whether geography directs certain behaviours or vice versa). The mixed method approach of the present study address this 'gap' by using GIS in addition to examining the social dimensions, such as personal preferences and economic restrictions of the geographical environment via participatory mapping and participant observation. Systems theory provides a platform in which the inter-related and mutually inclusive factors that determine local food environments and the potential influences such environments have on food choices can be appreciated and evaluated.

Geographic Information System (GIS) data alone cannot appropriately determine which stores are used, specifically in terms of proximity, which does not always equate to

accessibility. This has been described as ‘aggregation error’ where access (in terms of location, transportation, pricing and product availability) to a particular store type is defined as its distance, instead of the accurate reflection of what is actually accessible, not only in terms of geography but also economics and infrastructure (Thornton and Kavanagh, 2010; Caspi *et al.*, 2012). The extended use of a local food environment such that it includes more than the stores within close proximity has become of particular use as car ownership has increased and the shift in retail developments outside town centres. In addition, GIS cannot equate for personal preferences or other determining factors such as socio-economic status or store perceptions, nor can it examine the significance of food consumed within and outside the home (Buckley, Cowan and McCarthy, 2007; McDermott and Stephens, 2010; Thornton and Kavanagh, 2010). Therefore, I have used food recalls in order to assess dietary intake.

6.1.2 Food Recalls

Food intake methods have moved away from laboratory based experiments (Stroebele and Castro, 2004) towards surveys that focus on eating behaviours in the natural environment (Huang *et al.*, 1999; Morland, Wing and Diez Roux, 2002; Halford *et al.*, 2004; Morland, Diez Roux and Wing, 2006; Pachucki, Jacques and Christakis, 2011). A number of different methods have been developed, such as food diaries, food recalls and food frequency questionnaires in order to assess food intake (Bingham *et al.*, 1994; Wrieden *et al.*, 2003). Each has been designed for a defined purpose depending on the required depth of nutritional analysis (specific nutrient intake versus general dietary habits), scale of the sample being researched (individual, household or community) and the effort required by participants in the data collection process (Wrieden *et al.*, 2003). The importance placed upon each of these factors will, in part, determine which method is used. Some focus on specific nutrient intake, for example the amount of protein or fat consumed (Stephen, 1981; Seidell, 1998; Ames, 2001; Jakobsen *et al.*, 2010) or perhaps the relationship between vegetable intake and micronutrient levels (Huang *et al.*, 1999; Bernhardt and Schlich, 2006), whilst others concentrate on general dietary habits (Riediger, Shooshtari and Moghadasian, 2014). However, previous research has also tended to be rather specific, such as the number of times fast food is consumed (McDermott and Stephens, 2010) or the volume of sweetened beverages consumed (Halford *et al.*, 2004; Woodward-Lopez, Kao and Ritchie, 2011) opposed to all foods and drinks consumed inside and outside the home. The purpose of each individual study will determine which method is used and the required data

that is needed in order to answer the research question or test the hypothesis (Bingham *et al.*, 1994; Wrieden *et al.*, 2003; Thornton and Kavanagh, 2010).

My study used food recalls (or multiple pass recall) over seven consecutive days to provide an overview of the dietary intake of families in each study site. I chose 7-day food recalls, opposed to 24-hour recalls, as data from a single 24-hour period may give an abnormal or an unusual account of an individual's daily intake. Using a seven-day recall allows for possible 'anomalies' to be accounted for, specifically the difference between weekdays and weekends (Salvini *et al.*, 1989). However, food recalls as a method is not without limitations. For example, it is difficult to accurately determine portion sizes which in turn can significantly influence the nutrient values calculated from the analysis. Weighed food recalls provide a method that accurately measures the nutrient intake (e.g. protein, fat) by precisely determining portion sizes. They are similar to food recalls, except the 'actual' food consumed is recorded, often by weighing or measuring foods, however, it does require a substantial time and commitment from the respondents (Bingham *et al.*, 1994; Wrieden *et al.*, 2003). As a result, recruitment can be difficult and participant retention throughout the study minimal, resulting in low sample sizes (Bingham *et al.*, 1994). Therefore, weighed food recalls are inappropriate for a large survey to represent the dietary choices of residents in large environmental settings, such as towns or communities, which seven day food recalls can provide. Food frequency questionnaires (FFQs) are another means of collecting dietary intake data and allows for copious numbers of respondents. However, the results are dependent on how each category of the questionnaire is individually interpreted (Wrieden *et al.*, 2003; Thornton and Kavanagh, 2010). Food recalls allow for further questions to be asked during the daily interviews or interactions, such as how foods are prepared, where they are purchased as well as ideas about portion sizes, meal times and locations (Nielsen and Popkin, 2003; Stroebele and Castro, 2004). Furthermore, food recalls conducted over a seven day period, unlike others, allow for an understanding of both individual choices as well as household and social influences (Bove, Sobal and Rauschenbach, 2003).

Whilst the methods that are used to understand and analyse food choices have long been established, the questions and ideas in which they have been used to recognise have often ignored the impact of other factors that influence food choices (Thornton and Kavanagh, 2010). The importance of where and with whom food is consumed has been shown to have a significant impact on the types of foods and volume of food consumed (Castro and Castro, 1989; Nestle *et al.*, 1998; Shepherd, 1999; Bove, Sobal and Rauschenbach, 2003; Stroebele and Castro, 2004; Pachucki, Jacques and Christakis, 2011). Traditional dietary

intake methods do not regularly allow for the social and physical environment of the meal to be included. The exclusion of information such as where and with whom the food is consumed can alter the interpretation of the results significantly. For example, people eat more when eating in the presence of others than alone (Stroebele and Castro, 2004; Pachucki, Jacques and Christakis, 2011) and the physical surroundings and the aesthetics of the food influence food portions and choices (Stroebele and Castro, 2004). Food intake methods do not necessarily allow for additional information, unless specifically altered in order to address such concerns (Wrieden *et al.*, 2003). In addition, food intake methods do not allow for an adequate understanding of why particular food choices are made.

6.1.3 Participant Observation

Anthropologists have drawn upon ethnographic methods including participant observation in order to explore the sociality of food (Douglas, 1972; Douglas and Nicod, 1974; Jackson and Garvey, 1974; Zycherman, 2008). The immersion of researchers into the culture with which they are studying allows a deeper understanding not only for the social events but the ties and relationships within a community and the implications this may have on other aspects of life, for example attitudes towards food types (DeWalt and DeWalt, 2010; Emerson, Fretz and Shaw, 2011). However, participant observation does not allow for an understanding of the dietary specifics, such as nutrient intake (Stuckey *et al.*, 2014), nor can it provide a quantitative appreciation for the geographical food environment.

By adapting the traditional method of participant observation to meet the timelines of this project as well as allowing for larger number of participants involved, I lost some of the depth of insights into households and how they interact with their environment. Using pre-structured interview guides, steers the participants to specific topics of conversation and creates subconscious biases in terms of social desirability and hence not collecting data that reflects the true behaviours and attitudes of respondents. The specificity of the conversations also does not allow for the magnitude of inter-relating factors that play in the lives of individuals and households. As complex systems states and my own research has shown, factors of all areas of living may influence how people interact with their food environment and consequently food choices. Maintaining traditional ethnographic methods would have made it possible to fully validate these findings over a period of time.

6.1.4 Participatory Mapping

Originally the method of participatory mapping was applied to natural resource management research (Mapedza, Wright and Fawcett, 2003; International Fund for Agricultural Development, 2009) but has since become more prevalent in other disciplines and research areas (Chambers, 2006; Emmel, 2008). With advances in technology, participatory mapping methods have begun to use different mediums, for example the use of GIS and other computer based programmes (Chambers, 2006). Participatory mapping excels in being able to depict numerous scales and features (e.g. infrastructure or boundaries). In addition, it does not necessarily require extensive training and can be accessible to many individuals regardless of age, gender, socio-economic status or education level. Whilst participatory mapping techniques have been developed such that they can now be incorporated into many areas, relatively few studies have combined the use of participatory mapping in understanding food choices and food environments, which is clearly useful given the known limits of GIS. Despite research being dedicated to the geographical settings of food environments, the perception of food environments has not been significantly analysed.

6.1.5 Summary

There have been previous studies which have combined, to some extent, analysis of the local food environment, dietary intake and food choices. The individual application of participatory mapping has previously been combined with GIS data to show the perceived environment in comparison to the 'actual' geographic environment (Mapedza, Wright and Fawcett, 2003; Chambers, 2006). To the best of my knowledge, participatory mapping has not, however, been used in food environment and choice research. Timperio *et al.* (2008) have used food intake data (FFQs) and GIS methods in order to assess the effect of store type availability close to home and children's fruit and vegetable intake. Others have used qualitative techniques such as surveys and interviews with GIS findings (Liese *et al.*, 2007; Aggarwal *et al.*, 2011; Caspi *et al.*, 2012), yet such studies do not fulfil the extensive depth of understanding food environments and food choices, which requires an extensive insight to individuals and household relations and dynamics that participant observation can provide.

Nevertheless, despite the limitations of each method, as described above, which I have attempted to reduce by combining methods, the extent to which the results of this study can infer to the study of anthropology and local food environments must be taken with caution. The sample sizes used in my study do not allow for a significant statistical analysis of food intake data across the entire household or between heterogenic factors to run multi-variant analyses. More robust data in terms of sample sizes and perhaps more accuracy in the data provided may allow for whole household analysis to be conducted, taking into account the intake of children of different ages and households of different sizes.

In addition, the number of households who took part in the participant observation used provide a small window of insight into how households in their totality of each town use their food environments. The recruitment methods used may also create some convergance amongst findings from the househodls as many respondents were within the same or similar social groups which may influence their behaviours and attitudes towards food procurement and choices.

6.2 Future Research

The present study has shown the importance of local food environments in food choices made by households as well as the complexity of the determining factors of food choice. However, this study has not been able to show the full range of influencing factors in how the local food environment is constructed. Therefore, further analysis of the processes by which businesses determine where to set up their stores could provide a further level of analysis in understanding how the local food environment is constructed. Similarly, the decision process and criteria for local authorities as to which stores are granted permissions to set up a store will also allow an understanding of how the local food environment is determined. Furthermore, this could also provide information on the potential differences between local authorities and the influence this has on the local food environment but also other political aspects such as education and public health.

In addition, spending more time conducting participant observation within the household may provide a better long-term idea of how households make food choices and use their local food environment. This may include seasonal variations, celebrations or the

implications of changes in the household structure or lifestyle. The observational data used specifically in this project is designed to enhance and explain the trends from the GPS and food intake data. Therefore, by having data collected over a longer period, providing richer data, may explain these results further.

6.3 Conclusions

My study was designed to assess the effect of local food environments on family food choices. In particular I was interested in how local food environments differ, how they are used and how socio-economic status, family life and other aspects influence food choices and food related behaviours in families. I have used a combination of both qualitative and quantitative methods that provide insights to the geographical design of each food environment, the perceptions of each food environment, the nutritional outcomes of food choices and a deeper understanding of how food related decisions are made by the household in order to understand the local food environment, how households interact with the environment and their food choices. The results and interpretation of my data has shown that local food environments do differ between towns by the number and type of stores available, their density, proximity to the home, work and schools and location within the town. Local food environments differ most significantly by socio-economic status rather than their geography within Britain. In areas of high socio-economic status (as measured by IMD scores) such as Barnard Castle and Tunbridge Wells the types of stores available differs, with a lower percentage of the stores being classified as fast food or convenience but a higher number of restaurants and stores selling fresh fruit and vegetables. In turn, this has implications on nutritional intake and health.

However, other important aspects of a household other than their socio-economic status are important in understanding how food environments are used. As areas of high socio-economic status influence the physical environment, household socio-economic status is also influential in the availability and affordability of foods. Therefore, higher socio-economic status provides households with greater capital to be selective in what they purchase and consume or trade-offs. Individuals and households are more than just their socio-economic status but instead are a dynamic and complex system of personal preferences, generational influences, social networks and moral beliefs. The significance and importance placed upon each influential factor creates a trade-off. For example, in Barnard Castle households are able to actively seek foods outside the town to purchase

preferred foods as well as fitting in with other aspects of their lifestyle. This is possibly due to the higher socio-economic status of this town providing the means to purchase foods more selectively as well as accessibility to other towns via a car. The extent to which food types that comply with a household's moral beliefs or conform to their social networks are available, accessible and affordable will depend on the household's capital and agency in order to procure them and as a result household nutritional intake. My study has used a novel methodological approach combining the multi-dimensions of local food environment, food choices and family life to conclude that food environments and food choices differ between towns and are influenced by a number of factors that include aspects of geography, economics, social and cultural preferences as well as features of the family lifestyle.

APPENDICIES

Appendix 1: Portion images given to each household to help with the portion recall during food intake. Masse and volumes are known.



A



B



C



D



E



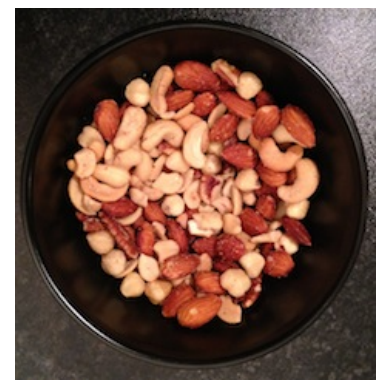
F



G



H



I



J



K



L

Appendix 2: Interview guide used in semi-structured interviews with households

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The Effect of Local Food Environments on Nutritional Status

Interview Questions

Household Purchasing

1. Where do you buy the majority of your food?
2. How often do you go shopping?
3. When do you normally go? (e.g. evening/weekend)
4. How do you get there?
5. Do you take a shopping list?
6. Online shopping?
7. Where is your closest supermarket?
8. Where is your closest fast food restaurant?
9. What other types of food shops do you have near to your house?
10. Do you ever go to a market?
11. Do you grow any of your own food? If so, what and why? If not, why?
12. What influences where you buy your food? (e.g. distance, price, chain of supermarket cleanliness of shop, friendliness of staff, other facilities also available) (rank these)
13. What influences what you buy?
 - a. Money/deal
 - b. Advertising/brands
 - c. Country foods are grown
 - d. Calories/nutritional content
14. Do you like to try new foods?
15. Since the recession, has your shopping/what food you eat changed at all?
16. Do you think healthier diets are more expensive than unhealthy ones?
17. Organic products?
18. Traffic light systems?
19. Horsemeat scandal?
20. Tesco – free sugar zone at the front of the shops?

Household Consuming

21. On an average day, how many meals would you prepare?
22. On an average day, what would these meals consist of?
23. Does everyone in your household have the same portion size?
24. On average, how much food would you say is wasted each day/week in your house?
25. How do these portions differ?
26. Who is the main food provider in your house?
27. Does everyone in your household eat the same things?
28. Do you use the same recipes as other people? (e.g. mother, friends etc.)
29. Do you like to try new recipes?
30. Do you eat any food from other countries? (e.g. Chinese, Italian, Indian etc.)
31. What influences what you cook? (e.g. time)
32. How often do you eat fast food?

33. How often do you eat at restaurants? / For what occasions would you eat at restaurants?
34. Do you eat the same types of foods as your friends/family?
35. Are there any foods that you do not eat? If so, why?
36. Is this the same for everyone in your household?
37. Does anyone in your household have any special dietary requirements? If so, why? (e.g. intolerance/allergy/personal preference)
38. Dieting industry? – influenced what you buy/eat or do you think that it has influenced people?
39. Where in the house do you eat?
40. Shopping in general? – enjoy it? Purpose?
41. Food shopping experience?
42. What does food mean to you?
43. What do you think constitutes as a healthy diet?
44. What do you think people should be most careful about i.e. calories/protein etc.?
45. What do you think convenience foods are?
46. Do you think the government/local councils do enough to promote healthy eating? If so, what do they do? If not, what could they do better?
47. What do you think stops people from eating healthily?
48. Do you think you eat a healthy diet?
49. What do you think are the consequences of having an unhealthy diet?
50. Do you know anything about micronutrients/vitamins and minerals?
51. What do micronutrients do?
52. Should you have them in your diet?
53. What do you think about micronutrient supplements?
54. What about physical activity? How important is physical activity? Is it more important than a healthy diet?
55. Importance of food? (i.e. as a social thing etc.)
56. McDonalds e.g. – businesses fault?
57. Education – what role does this have to play on diets?

Local Environments

58. Do you think that where you live influences your health?
59. Do you think that where you live influences what you eat?
60. North/south divide in UK?

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